

The *boharti* Species Group of the Genus *Pherocera* (Diptera: Therevidae: Phycinae)

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INTRODUCTION

The published history of *Pherocera* is meager. The genus was described by Cole (1923a) for three species: *P. albihalteralis* Cole, *P. flavipes* Cole, and *P. signatifrons* Cole, with *P. signatifrons* designated as the type-species. At that time, Cole had available for study only eight female specimens, six of which were *P. signatifrons*. That same year, Cole (1923b) described a fourth species, *Pherocera nigripes* Cole, based on a single female from Mexico. Except for passing mention by Hardy (1927:385), Rodendorf (1964:86), Cole (1965:349), and Cole and Schlinger (1969:170, 172), no reference was made of the genus *Pherocera* until the 1970's.

An important factor in any account of *Pherocera* is its historical rarity in entomological collections. Until the beginning of 1940 only 18 specimens were known to exist in collections, and during the 1940's only 34 were added. After 1952 the number of specimens of this genus increased greatly, due largely to the collecting efforts of Evert I. Schlinger. I became interested in the group and added considerably to the collections between 1963 and 1970. During the 1970's specimens were gathered mainly through the efforts of Saul I. Frommer who maintained a malaise trap in the P. L. Boyd Desert Research Center near Palm Desert, Riverside County, California.

The genus *Pherocera* has a restricted distribution, being confined to western North America. Its northern limit, according to specimens examined, is in Oregon and Idaho; its southern limit is near Puebla, Mexico. It has been collected as far east as Colorado, New Mexico, and western Texas. Its current center of distribution is southern California.

I completed a study of *Pherocera* and its relatives in 1971 (Irwin, 1971) and published a paper on two closely related genera, *Schlingeria* Irwin and *Parapherocera* Irwin, six years later (Irwin, 1977). Previously I published on the comparative morphology of the female terminalia and oviposition behavior in the Therevidae, including a section on *Pherocera* (Irwin, 1976). A review of the Nearctic genera of Therevidae (Irwin and Lyneborg, 1981a) contained a redescription of the genus *Pherocera* and included the following statement (p. 268): "Thirty species of the genus *Pherocera* have been described but not formally published." My dissertation (Irwin, 1971) divided the 34 recognized species of *Pherocera* into seven species groups, one of which included *P. flavipes* and seven additional species. Although designated the "*flavipes* group" in the dissertation, I am renaming it the "*boharti* group" in honor of Richard M. Bohart, mentor and esteemed friend. This paper describes the seven unpublished species of the *boharti* group and updates the description of *P. flavipes*.

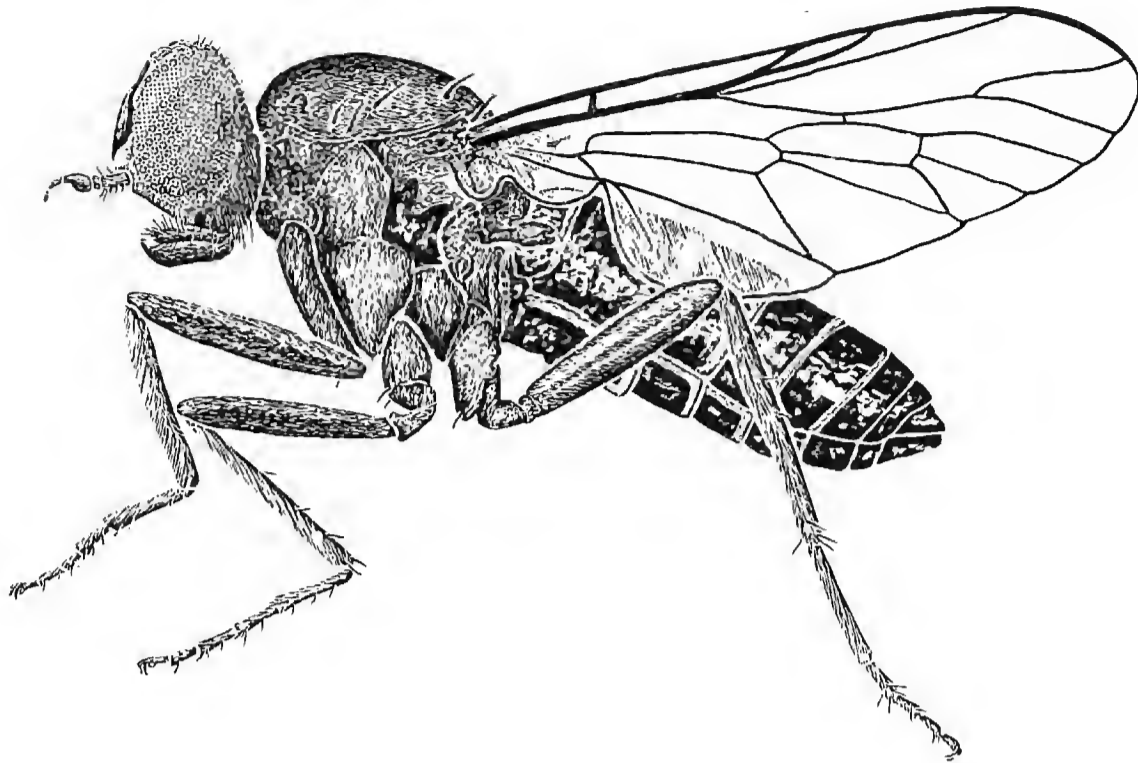


Fig. 1. *Pherocera rupina*, female (1725), lateral view.

ACKNOWLEDGMENTS

Richard M. Bohart, more than any person, bolstered my early interest in insect systematics. I strongly support the efforts of Arnold Menke and Eric Grissell in dedicating this issue of Pan-Pacific Entomologist to Dick for his generous and enriching fellowship. To Dick and his gracious wife, Margaret, I extend heartfelt and eternal gratitude.

I earnestly thank the following for contributing to this manuscript: Evert I. Schlinger, University of California at Berkeley; Saul I. Frommer, University of California at Riverside; Donald W. Webb, David J. Voegtlin, and John K. Bouseman, Illinois Natural History Survey, for critical review of the manuscript; and John P. Sherrod, Illinois Natural History Survey, for drawing Figs. 6–11. The curators of several of the major entomological museums are gratefully acknowledged for loaning valuable material.

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METHODS AND PROCEDURES

Specimen number.—Each specimen has been assigned a unique number to facilitate the association of data. The number appears below the specimen on a yellow label bearing the following words: THEREVIDAE/M. E. IRWIN/SPECIMEN #. Numbers referring to specimens will not be found in the text even though they have been used to incorporate ecological and label data associated with the specimens into an automated data management system designed by Rauch (1970). These numbers have been associated with individual specimens in the figures, however. If ecological or depository information regarding individual specimens is needed, please contact the author.

Format of "Specimens examined" section.—To conserve space and include as much information about each specimen as possible, the following layout, adopted from Irwin (1977), was used in the "Specimens examined" section under each species. Many of these terms are more fully explained by Stuckenberg and Irwin (1973): 1) **LARGEST POLITICAL UNIT** [country, or state within the United States, in capital letters], 2) **intermediate political unit** [state or province, or county within the United States, in boldface print], 3) smallest political unit [city or town in regular print], 4) modifier of smallest political unit [distance (km) and direction, or subunit, in regular print], 5) **elevation** [in meters (m) above sea level, in boldface print], 6) year/month/day that the specimen was collected [year expressed by two digits, the "19" has been omitted since all specimens examined were collected in the 1900's], 7) collector(s) [acronym(s), not in parentheses, expanded below], 8) number of specimens of each sex [δ or ♀], and 9) [a semicolon indicates that data for previous specimens terminate and data for the next series of specimens follow]. If subsequent specimen data are not included, data not repeated are the same as those of preceding specimens.

Collectors.—AFH, Howland, A. F.; ALM, Melander, A. L.; ARG, Gillogly, A. R.; ATM, MacClay, A. T.; CAT, Toschi, C. A.; CTB, Brues, C. T.; DEF, Fox, D. E.; EIS, Schlinger, E. I.; EMP, Painter, E. M.; FDP, Parker, F. D.; FXW, Williams, F. X.; GRB, Balmer, G. R.; HAH, Hunt, H. A.; HKC, Court, H. K.; HRM, Moffit, H. R.; JAP, Powell, J. A.; JCB, Bradley, J. C.; JCD, Downey, J. C.; JCH, Hall, J. C.; JFL, Lawrence, J. F.; JRQ, Quezada, J. R.; JT, Turner, J.; JW, Wilcox, J.; JWM, MacSwain, J. W.; KWB, Brown, K. W.; LAS, Stange, L. A.; LFL, Lapre, L. F.; MEI, Irwin, M. E.; MTJ, James, M. T.; PAR, Rauch, P. A.; PDH, Hurd, P. D.; PHA, Arnaud, P. H.; RAS, Stirton, R. A.; RCB, Bechtel, R. C.; RES, Somerby, R. E.; RHP, Painter, R. H.; RMB, Bohart, R. M.; RMW, Worley, R. M.; SIF, Frommer, S. I.; SL, Larisch, S.; SLF, Frommer, S. L.; WAS, Steffan, W. A.; WI, Icenogle, W.; WJH, Hanson, W. J.; WRM, Mason, W. R.

Depositories.—Specimens from this study have been deposited with the following museums: AMNH, American Museum of Natural History, New York; ANSP, Academy of Natural Sciences, Philadelphia, Pennsylvania; ASU, Arizona State University, Tempe; AMS, Australian Museum, Sydney; BMH, Bernice P. Bishop Museum, Honolulu, Hawaii; BMNH, British Museum of Natural History, London, England; BYU, Brigham Young University, Provo, Utah; CAS, California Academy of Sciences, San Francisco; CIS, California Insect Survey, University of California, Berkeley; CMNH, Field Museum of Natural History, Chicago, Illinois; CMP, Carnegie Museum, Pittsburgh, Pennsylvania; CNC, Canadian National Collection, Ottawa; CSDA, California State Department of Agriculture, Sacramento; CSIR, Commonwealth Scientific Industrial Research Organization, Canberra, Australia; CSU, Colorado State University, Fort Collins; CU, Cornell University, Ithaca, New York; DEI, Deutsches Entomologisches Institut, Berlin, East Germany; DSIR, Department of Scientific and Industrial Research, Nelson, New Zealand; DZSA, Departamento de Zoologia Agricultura, São Paulo, Brazil; EEA, Estación Experimental Agronómica, Universidad de Chile, Maipú; FSCA, Florida State Collection of Arthropods, Gainesville; IAS, Institute of Agricultural Sciences, Tokyo, Japan; IE, Instituto di Entomologia, Bologna, Italy; IML, Instituto Miguel Lillo, Tucumán, Argentina; INHS, Illinois Natural History Survey, Champaign; INIA, Instituto Nacional de Investigaciones Agrícolas, Chapingo,

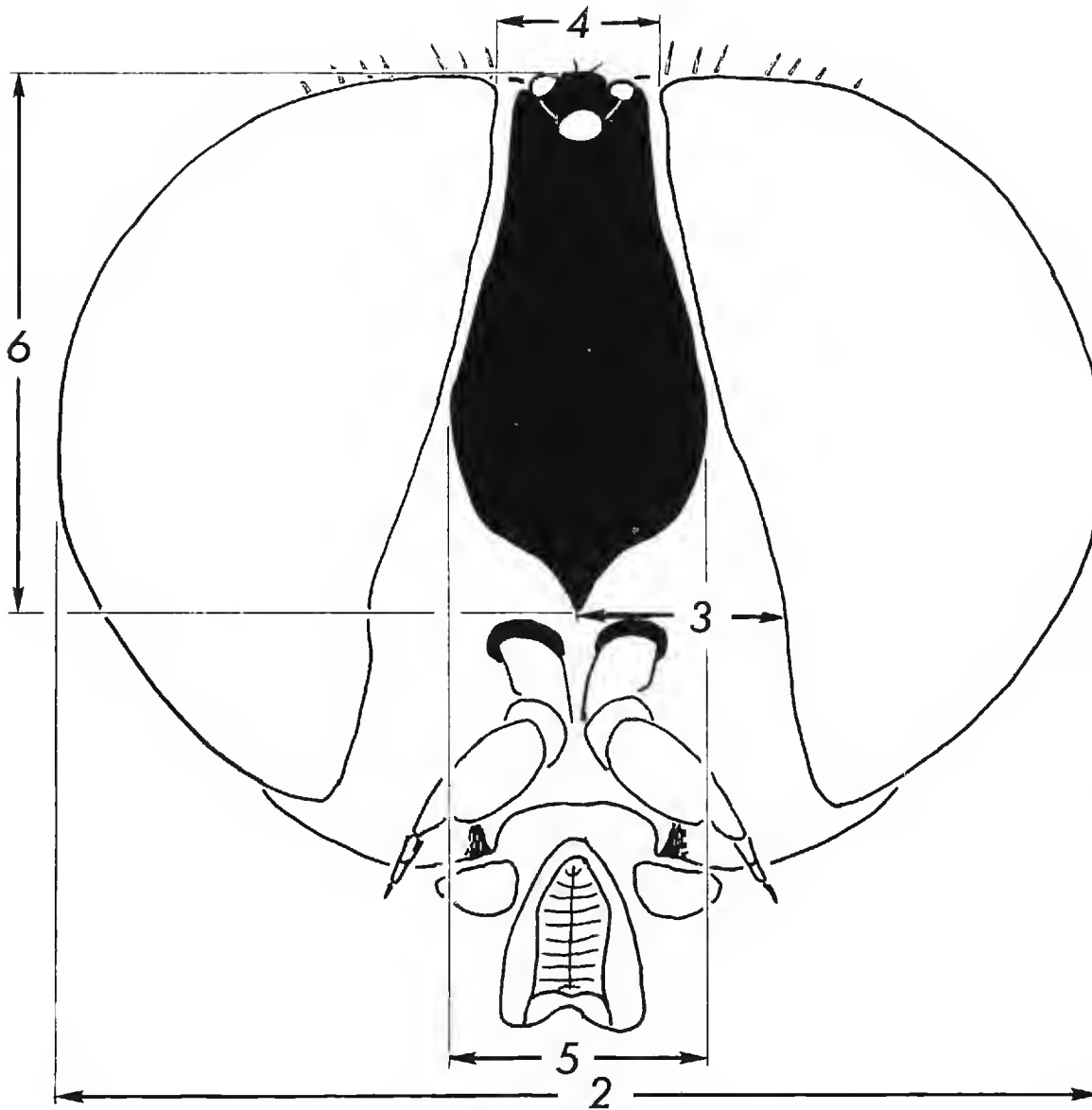
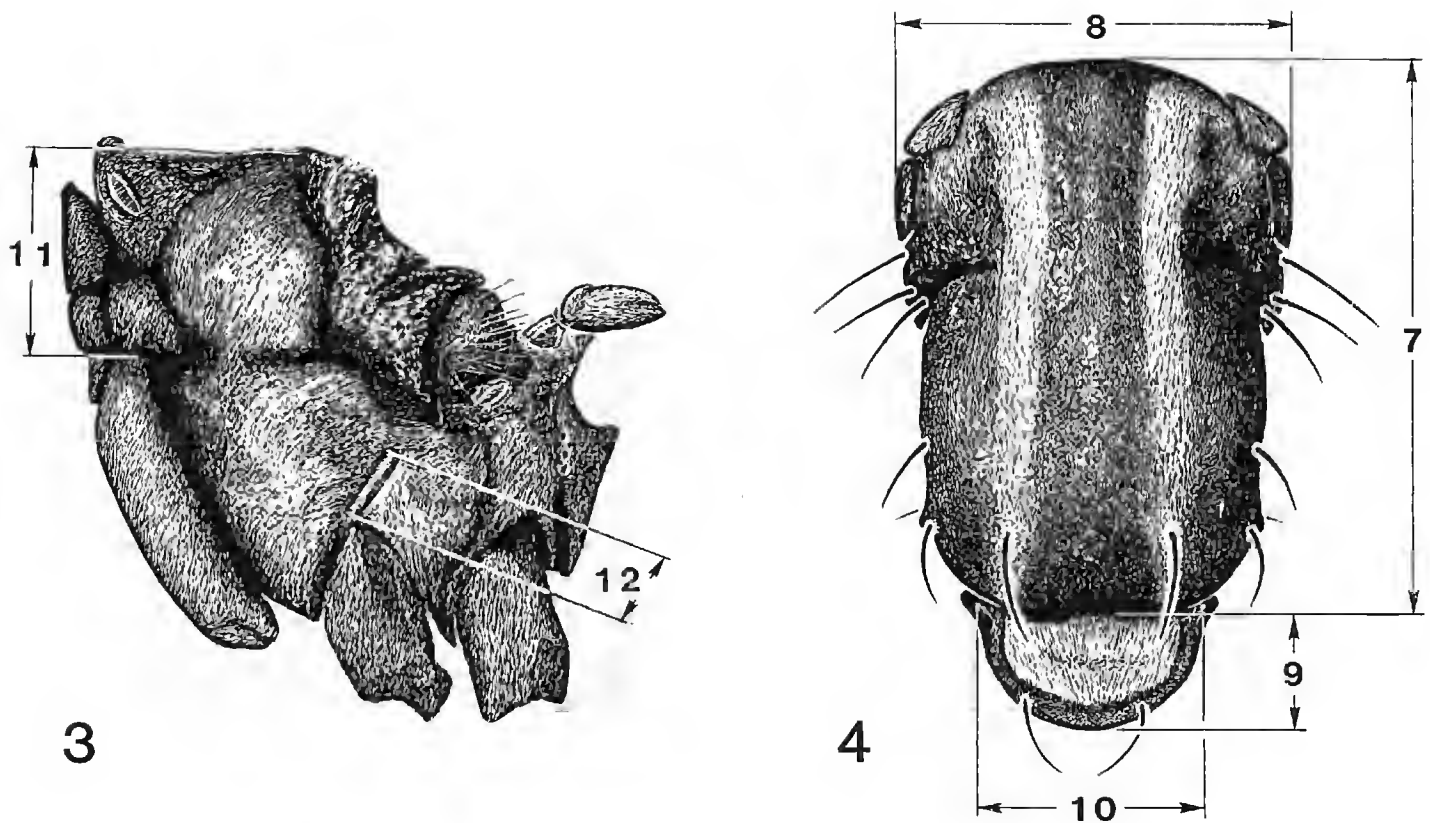


Fig. 2. *Pherocera rupina*, female (1725), head, frontal view. Arrows give linear measurements corresponding to continuous character states in text: 2 = head width; 3 = distance from center of frons to compound eye margin at dorsal margin of antennal socket; 4 = interocular distance at vertex; 5 = width of frontal callosity; 6 = height of frontal callosity.

Mexico; IOC, Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; IRSN, Institut Royal des Sciences Naturelle de Belgique, Brussels; ISU, Iowa State University, Ames; ITM, Instituto Tecnológico y de Estudios Superiores, Monterrey, Mexico; KSU, Kansas State University, Manhattan; KUF, Kyushu University, Fukuoka, Japan; LACM, Natural History Museum of Los Angeles County, California; LBSC, California State University at Long Beach; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MEI, M. E. Irwin Collection; MHN, Museo de Historia Natural Javier Prado, Lima, Peru; MMB, Moravske Museum, Brno, Czechoslovakia; MNH, Musei Nationalis Hungarici, Budapest, Hungary; MNHN, Museum National d'Histoire Naturelle, Paris, France; MSU, Michigan State University, East Lansing; NCSU, North Carolina State University, Raleigh; NMB, Naturhistorisches Museum, Basel, Switzerland; NMP, Natal Museum, Pietermaritzburg, South Africa; NMSU, New Mexico State University, Las Cruces; NSDA, Nevada State Department of Agriculture, Reno; OSM, Ohio State Museum, Columbus; OSU, Oregon State University, Corvallis; PAS, Polish Academy of Sciences, Warsaw; RNHL, Rijkmuseum van Natuurlijke Historie, Leiden, The Netherlands; SDAP, State Department of Agriculture, Harrisburg, Pennsyl-



Figs. 3, 4. Thorax of *Pherocera rupina* female (1725). 3, Lateral view. 4, Dorsal view. Arrows give linear measurements corresponding to continuous character states in text: 7 = length of thorax exclusive of scutellum; 8 = width of thorax at wing bases; 9 = length of scutellum; 10 = width of scutellum; 11 = distance between ridge above prothoracic spiracle and basal margin of forecoxa; 12 = length of mesopleural suture separating katepisternum and katepimeron.

vania; SDCM, San Diego County Museum, California; SJSC, San Jose State University, California; SMN, Staatlichen Museum für Naturkunde, Stuttgart, West Germany; SWRS, Southwestern Research Station (AMNH), Portal, Arizona; TAM, Texas Agricultural and Mechanical University, College Station; UA, University

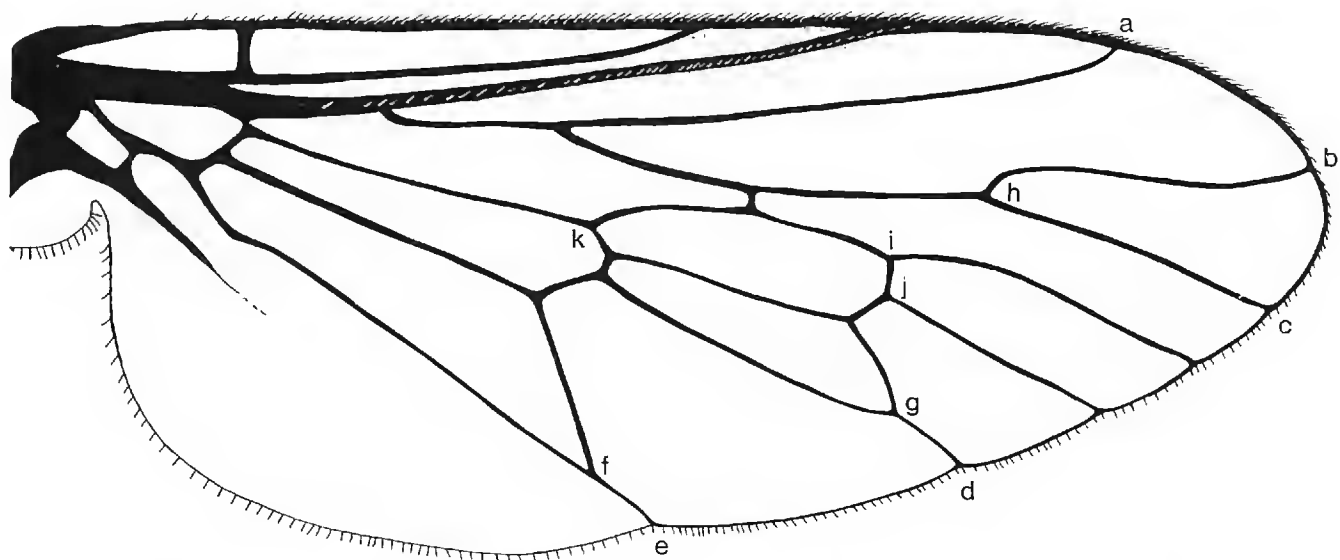


Fig. 5. Wing of *Pherocera rupina* male (3185). Letters give landmarks between which linear measurements correspond to continuous character states in text: g-d (character 13) = length of vein M₃+CuA₁; f-e (character 14) = length of Cu₂+2nd A; a-i (character 15) = distance from distal end of R₂₊₃ to distal margin of 1st M₂ cell; h-b (character 16) = length of vein R₄ from fork of R₄₊₅; h-c (character 17) = length of vein R₅ from fork of R₄₊₅; b-c (character 18) = distance from distal end of vein R₄ to distal end of vein R₅; k-j (character 19) = longest length of 1st M₂ cell; h-i (character 20) = distance from fork R₄₊₅ to closest point of 1st M₂ cell.

of Arizona, Tucson; UAC, University of Alberta, Canada; UCB, University of British Columbia, Vancouver, Canada; UCD, University of California, Davis; UCM, University of Colorado Museum, Boulder; UCR, University of California, Riverside; UCVM, Universidad Central de Venezuela, Maracay; UG, University of Georgia, Athens; UI, University of Idaho, Moscow; UK, University of Kansas, Lawrence; UM, University of Minnesota, Saint Paul; UMA, University of Michigan, Ann Arbor; UNLP, Museo de Ciencias Naturales, Universidad Nacional de La Plata, Argentina; USI, University of Southern Illinois, Carbondale; USNM, United States National Museum, Washington, D.C.; USSR, Zoological Institute USSR, Leningrad; USU, Utah State University, Logan; UTA, University of Texas, Austin; UTI, University of Tel Aviv, Israel; UU, University of Utah, Salt Lake City; UW, University of Wisconsin, Madison; UZM, Universitetets Zoologiske Museum, Copenhagen, Denmark; VNM, Naturhistorisches Museum, Vienna, Austria; WSU, Washington State University, Pullman; ZIB, Zoologisches Institut, Berlin, West Germany; ZSI, Zoological Survey of India Collection, Calcutta, India.

Characters used—continuous character states.—The following characters were measured for all female *boharti* group holotypes herein described (Table 1):

Overall length

- Ch. 1. Measurements were taken from the posterior tip of the abdomen to and including any protuberance on the frons, but not including the antennae.

Head, measured as illustrated in Fig. 2.

- Ch. 2. Head width.
 Ch. 3. Distance from center of frons to compound eye margin at dorsal margin of antennal socket.
 Ch. 4. Interocular distance at vertex.
 Ch. 5. Width of frontal callosity. The frontal callosity (= dark shiny area between compound eyes of most females in the genus *Pherocera*) is an extremely important species specific character. Males in the *boharti* group lack this callosity.
 Ch. 6. Height of frontal callosity. This character was sometimes difficult to measure on rubbed specimens because it was difficult to determine where the callosity ended and the ocellar tubercle began.

Thorax, measured as illustrated in Figs. 3 and 4.

- Ch. 7. Length of thorax exclusive of scutellum.
 Ch. 8. Width of thorax at wing bases.
 Ch. 9. Length of scutellum measured from posterior margin of scutellum, through its center, to posterior margin of mesonotum.
 Ch. 10. Width of scutellum, measured to include widest part of scutellum excluding basal flanges.
 Ch. 11. Distance between ridge above prothoracic spiracle and basal margin of forecoxa.
 Ch. 12. The length of the broad ventral section of the mesopleural suture separating the katepisternum and katepimeron.

Wing, measured as illustrated in Fig. 5. This illustration gives landmarks, as letters (a) through (k), and the following characters represent linear measurements between landmarks:

- Ch. 13. g-d Length of vein M_3+Cu_1 .
- Ch. 14. f-e Length of $Cu_2+2nd\ A$.
- Ch. 15. a-i Distance from distal end of R_{2+3} to distal margin of 1st M_2 cell.
- Ch. 16. h-b Length of R_4 from fork of R_{4+5} .
- Ch. 17. h-c Length of R_5 from fork of R_{4+5} .
- Ch. 18. b-c Distance from distal end of R_4 to distal end of R_5 .
- Ch. 19. k-j Longest length of 1st M_2 cell.
- Ch. 20. h-i Distance from fork R_{4+5} to closest point of 1st M_2 cell.

Characters used—discrete character states.—The characters listed below form a matrix (Table 2) with the included species in the *boharti* group. It is hoped that the matrix will prove useful in the separation and recognition of species, augmenting to some degree the dichotomous key.

Ch. 21. Lower gena

- a. entirely tomentose (Fig. 14).
- b. with a definite bare stripe (Figs. 12, 13, 15-19). In one species no bare area exists on the lower gena (*P. tomentamala*, state 21a), while a definite bare area, generally confined to a narrow stripe between the frontobasal compound eye margin and the lower margins of the oral cavity, is evident on the remaining species of the *boharti* group (state 21b). Rubbed specimens sometimes have "bare" areas on the genae, but these are generally less well defined than the true non-tomentose stripe of state 21b.

Ch. 22. Cuticular coloration of thorax

- a. orange to red
- b. dark brown to black

Ch. 23. Cuticular coloration of abdomen

- a. orange to red
- b. light brown to tan
- c. mostly dark brown to black

Ch. 24. Thoracic vittae

- a. distinct, dark
- b. indistinct, powdered over, but discernible
- c. indiscernible

Ch. 25. Cuticular coloration of palp

- a. light brown to tan
- b. dark brown to black

Ch. 26. Cuticular coloration of hindfemur

- a. mostly dark brown to black
- b. mostly reddish-orange to tan

Ch. 27. Cuticular coloration of midfemur

- a. mostly dark brown to black
- b. mostly reddish-orange to tan

Ch. 28. Cuticular coloration of midtibia

- a. mostly dark brown to black
- b. mostly reddish-orange to tan

Ch. 29. Frontal callosity of female

- a. reaching ocellar tubercle
- b. not reaching ocellar tubercle

Table 1. Measurements in mm of holotype females of the *boharti* group (the *P. flavipes* specimen is not the holotype).

Characters	Species and specimen number							
	<i>bishop- ensis</i> 2804	<i>boharti</i> 1624	<i>boydi</i> 1537	<i>flavipes</i> 1330	<i>nigragena</i> 1578	<i>rufoab- dominalis</i> 2626	<i>rupina</i> 1725	<i>tomen- tamala</i> 1670
1	5.26	4.76	4.31	4.82	5.60	4.65	4.87	5.04
2	1.36	1.20	1.19	1.23	1.48	1.30	1.40	1.29
3	0.31	0.24	0.25	0.31	0.36	0.28	0.27	0.28
4	0.18	0.18	0.18	0.21	0.21	0.18	0.20	0.21
5	0.31	0.38	0.28	0.42	0.42	0.27	0.32	0.31
6	0.27	0.60	0.62	0.60	0.64	0.38	0.70	0.57
7	1.36	1.29	1.26	1.26	1.50	1.27	1.43	1.33
8	1.37	1.06	1.06	1.20	1.27	1.20	1.37	1.26
9	0.28	0.27	0.25	0.25	0.36	0.28	0.31	0.28
10	0.52	0.56	0.48	0.50	0.59	0.29	0.59	0.57
11	0.48	0.41	0.41	0.49	0.56	0.46	0.53	0.50
12	0.15	0.14	0.17	0.17	0.18	0.17	0.18	0.18
13	0.20	0.14	0.15	0.20	0.14	0.13	0.13	0.13
14	0.24	0.17	0.17	0.13	0.18	0.22	0.17	0.18
15	0.91	0.81	0.83	0.78	0.88	0.78	0.91	0.88
16	0.92	0.88	0.88	0.81	0.95	0.84	0.85	0.97
17	0.87	0.88	0.87	0.80	0.87	0.80	0.80	0.91
18	0.45	0.42	0.34	0.36	0.42	0.34	0.42	0.43
19	0.84	0.84	0.71	0.84	0.97	0.81	0.85	0.84
20	0.34	0.28	0.28	0.34	0.32	0.32	0.39	0.35

Ch. 30. Ventral gonocoxal spur of male terminalia

- a. one-appendaged, molar-shaped or with minute teeth (Figs. 46–51)
- b. one-appendaged, elongate molar-shaped, with rounded ventrolateral lobe (Fig. 45)
- c. two-appendaged, one tapered, the other elongate, spine like (Fig. 44)

Ch. 31. Adults mainly occur in

- a. desert canyon bottom environments
- b. montane environments
- c. dry wash environments
- d. inland stable sand dune environments

Ch. 32. Principal landing substrate of adults is

- a. rock
- b. twig on ground
- c. soil-leaf litter

Definition of special morphological terms.—Most terms used in this paper can be found in Torre-Bueno (1950), Lyneborg (1968, 1972), Irwin (1973, 1976, 1977), Irwin and Lyneborg (1981a, 1981b), and McAlpine *et al.* (1981); those that cannot or are used in a different connotation or otherwise need clarification follow:

Frontal callosity: The area of the female frons usually devoid of tomentum.

Genal stripe: The stripe, devoid of tomentum, on the lower gena connecting

Table 2. Discrete states of characters 21-32 explained in text for species of the *boharti* group.

Characters	Species							
	<i>bishop-ensis</i>	<i>boharti</i>	<i>boydi</i>	<i>flavipes</i>	<i>nigrigena</i>	<i>rufoabdominalis</i>	<i>rupina</i>	<i>tomentamala</i>
21	b	b	b	b	b	b	b	a
22	b	a	b	b	b	b	b	b
23	a	b	c	c	c	a	c	c
24	b	c	b	a&b	a	b	b	b
25	a	a	b	b	b	a	a	b
26	b	b	b	b	a	b	a	b
27	b	b	b	b	a	b	a	b
28	b	b	b	b	b	b	a	b
29	b	a	a	a	a	b	a	a
30	a	b	c	a	a	a	a	a
31	c	b	a	a&b	a	a	a	d
32	a	c	a	a	a	a	a	b

the lower margin of the compound eye with the lower margin of the oral cavity.

Ventral gonocoxal spur: An extension of the gonocoxite (Fig. 10, vgs), possibly homologous with the ventral lobe of the gonocoxite of Lyneborg (1968) and Irwin and Lyneborg (1981a).

Pile: Long, thin hair without a noticeable socket.

Tomentum: Short, scalelike hair densely covering exoskeleton; sometimes referred to by other authors as pollen.

The *boharti* Group of *Pherocera*

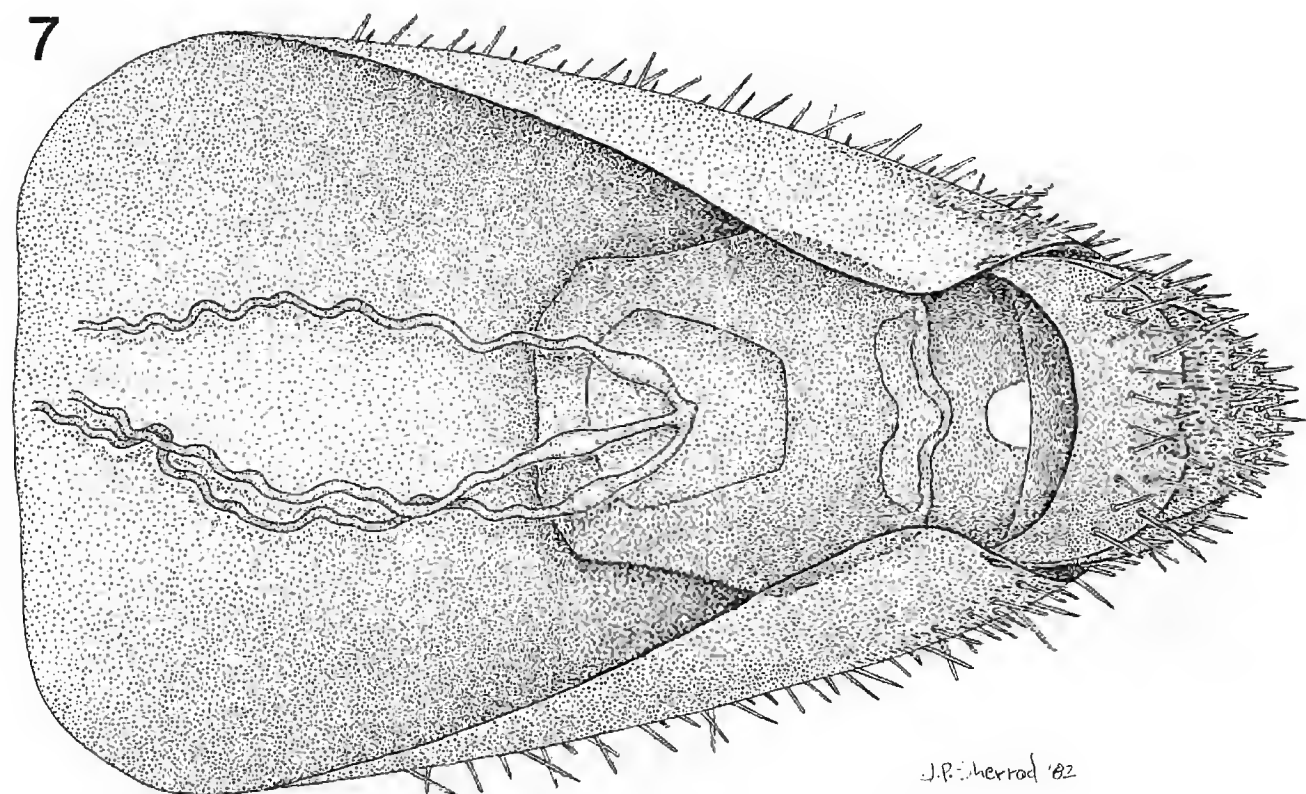
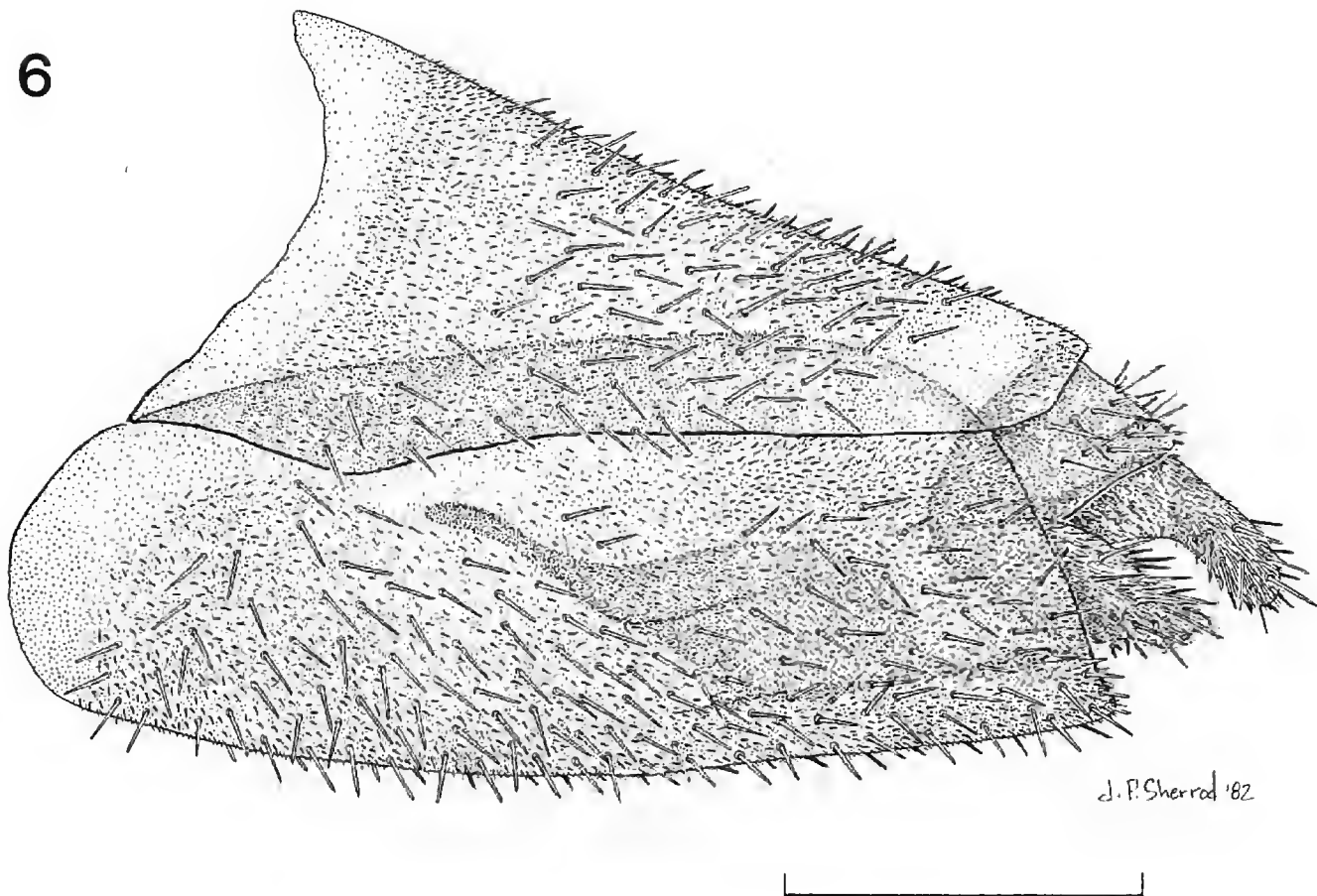
Diagnosis.—Body usually dark brown to black (*rufoabdominalis* and *bishopensis* with red abdomens, *boharti* with reddish-orange thorax, tan abdomen); tomentum usually silver to silver-gray, dense on face and thorax, sparse on abdomen.

Head: Tomentum dense, silver-gray on upper frons and vertex and silver on lower frons and gena; facial pile white; palp white pilose; female dichoptic, facets of uniform size; male holoptic, facets divided in most species, or facet size grading from smaller ventrad to larger dorsad (*boydi*, *tomentamala*); antennal flagellum pear-shaped to elongate pear-shaped (Figs. 20-27); maxillary palp with distinct terminal indentation, one-jointed (Figs. 28-35).

Thorax: Mesonotal vittae distinct (*nigrigena*, *flavipes*), indistinct but discernible (*bishopensis*, *boydi*, *flavipes*, *rufoabdominalis*, *rupina*, *tomentamala*), or indiscernible (*boharti*); vein M_3+CuA_1 reaching wing margin (Fig. 5, g-d). Halter knob white; proximal $\frac{3}{4}$ to $\frac{5}{6}$ of foretibia with dense, white pile.

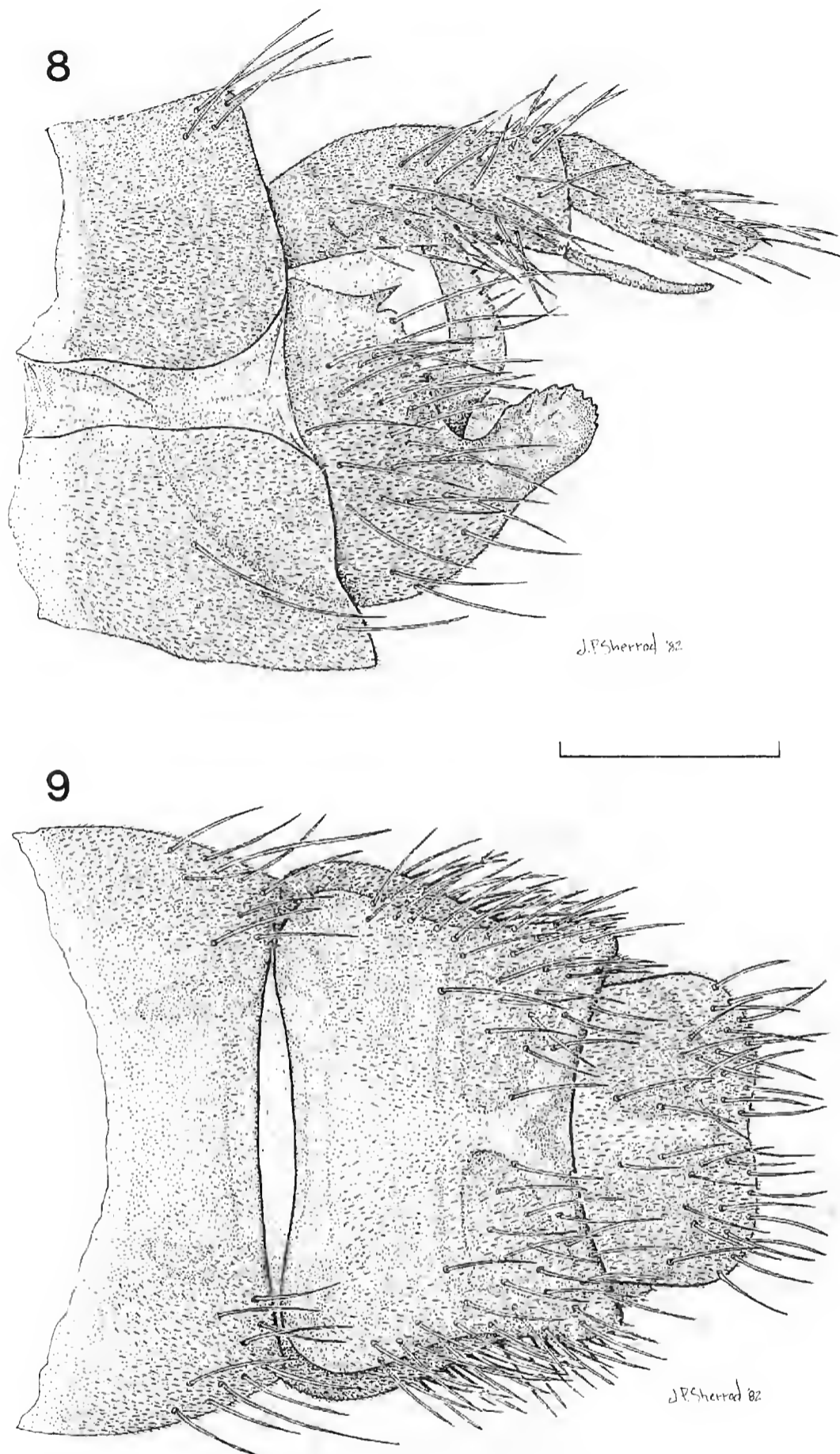
Abdomen: Male terminalia (Figs. 8, 9) with hypoproct fitted partially beneath epandrium, variously shaped (Figs. 36-43); ventral gonocoxal spurs (vgs), gonostyli (g) (Fig. 10) variously shaped (Figs. 44-51), and aedeagus (Fig. 11) complex (Figs. 52-59). Female terminalia (Figs. 6, 7) simple; furca with two membranous areas, through the anterior of which passes the coalesced spermathecal duct (Fig. 7).

Relationships.—The *boharti* group has a sister-group relationship with the *albihalteralis* group, for which *P. albihalteralis* was formally described (Cole, 1923a), but can be distinguished from it by the ventral gonocoxal spur being one-appen-



Figs. 6, 7. Female terminalia of *Pherocera rufoabdominalis* (2506). 6, Lateral view. 7, Dorsal view with tergite 8 removed. Scale = 0.2 mm.

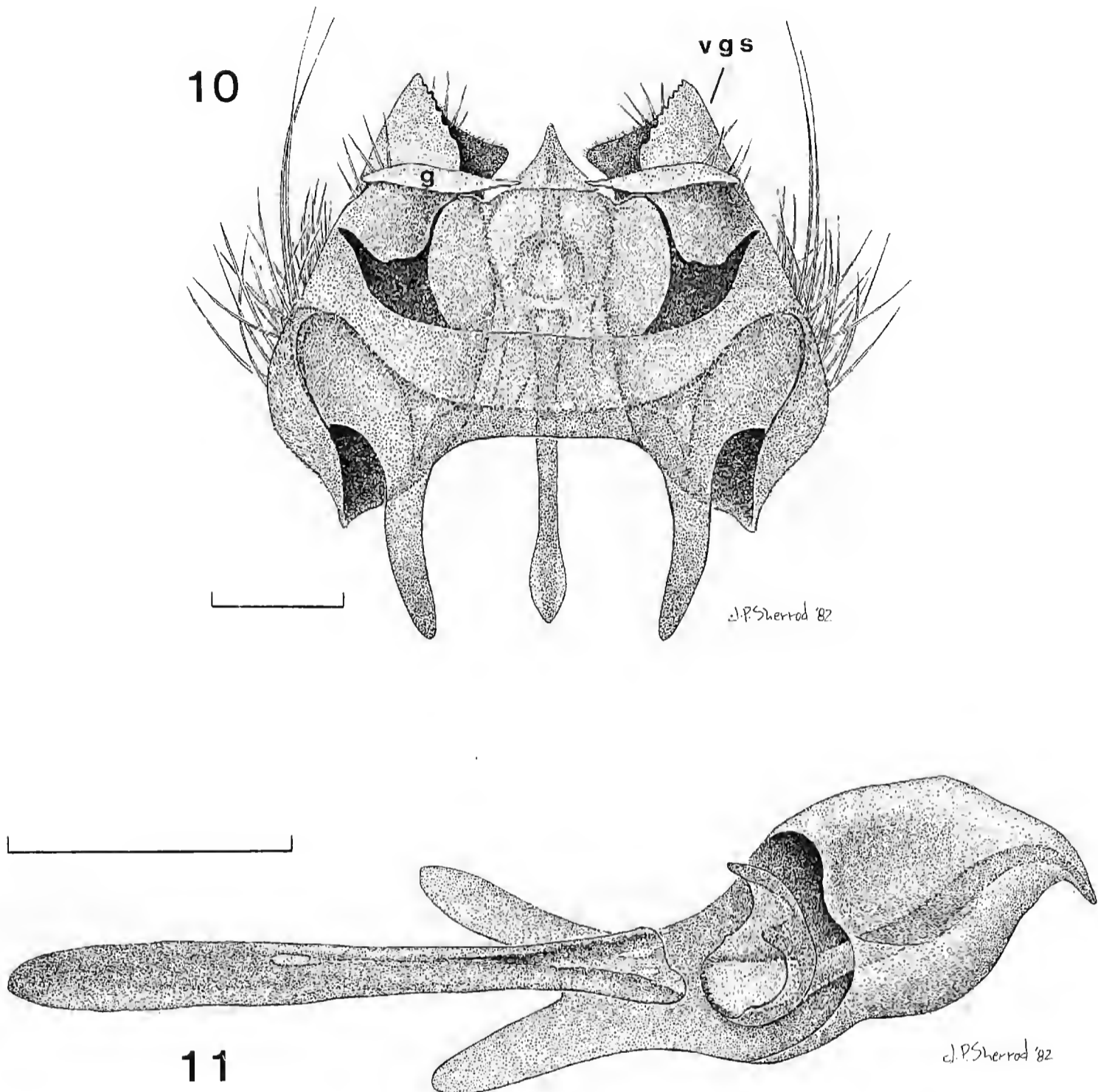
daged, one molar-shaped or rounded and with minute teeth (Figs. 46–51), one-appendaged, elongate molar-shaped with a lateroventral rounded lobe (Fig. 45), or two-appendaged, one molar-shaped, the other spinelike (Fig. 44), while members of the *albihalteralis* group have spurs two-appendaged, sharp, spinelike, equal or unequal in length or one-appendaged, sharp, elongate or fanglike and elongate.



Figs. 8, 9. Male terminalia of *Pherocera rufoabdominalis* (2432). 8, Lateral view. 9, Dorsal view. Scale = 0.2 mm.

The *boharti* group is also characterized by having a bare stripe on each lower gena between the frontobasal compound eye margins and the lower margins of the oral cavity (except *P. tomentamala*).

Within the *boharti* group the species may be further grouped on the basis of their ventral gonocoxal spurs and gonostyli. Two related species, *bishopensis* and



Figs. 10, 11. Male genitalia of *Pherocera rufoabdominalis* (2511). 10, Dorsal view with epandrium removed. 11, Aedeagus, dorsolateral view. Scale = 0.1 mm.

rufoabdominalis, are distinct in having hatchet-shaped gonostyli and cuspidlike ventral gonocoxal spurs. *P. boydi* is distinct in having spinelike and exaggeratedly lobed ventral gonocoxal spurs. *P. boharti* is characterized by an elongate, cuspid-shaped ventral gonocoxal spur and a gonostylus with an elongate lateral spine. *P. rupina*, *tomentamala*, *nigragena*, and *flavipes* appear closely related, having elongate, sometimes double-tipped, gonostyli and single ventral gonocoxal spurs that are molar-shaped in appearance.

Included species.—*P. bishopensis* Irwin, sp. nov.; *P. boharti* Irwin, sp. nov.; *P. boydi* Irwin, sp. nov.; *P. flavipes* Cole, 1923a; *P. nigragena* Irwin, sp. nov.; *P. rufoabdominalis* Irwin, sp. nov.; *P. rupina* Irwin, sp. nov.; and *P. tomentamala* Irwin, sp. nov.

KEY TO THE SPECIES OF THE *BOHARTI* GROUP

1. Palps dark brown to black 2
- Palps yellow to light brown 5
2. Hindfemur dark brown to black; ventral gonocoxal spur and gonostylus (♂) as in Fig. 49; frontal callosity (♀) as in Fig. 16 .. *nigragena* Irwin, sp. nov.
- Hindfemur mostly orange to tan 3
3. Lower gena without a bare stripe; ventral gonocoxal spur and gonostylus (♂) as in Fig. 46; frontal callosity (♀) as in Fig. 14 *tomentamala* Irwin, sp. nov.
- Lower gena with bare stripe 4
4. Ventral gonocoxal spur (♂) bilobed, one elongate, spinelike (Fig. 44); frontal callosity (♀) as in Fig. 12. Mesonotal vittae indistinct, powdered over *boydi* Irwin, sp. nov.
- Ventral gonocoxal spur (♂) molar-shaped (Fig. 48); frontal callosity (♀) as in Fig. 17. Mesonotal vittae usually distinct *flavipes* Cole
5. Abdomen red; thorax dark brown to black 6
- Abdomen tan or brown; thorax dark brown to tannish-orange 7
6. Frontal callosity (♀) with central tomentose zone (Fig. 19); ventral gonocoxal spur and gonostylus (♂) as in Fig. 51 *bishopensis* Irwin, sp. nov.
- Frontal callosity (♀) without tomentose island (Fig. 18); ventral gonocoxal spur and gonostylus (♂) as in Fig. 50 *rufoabdominalis* Irwin, sp. nov.
7. Thorax orangish-tan; frontal callosity (♀) as in Fig. 13; ventral gonocoxal spur and gonostylus (♂) as in Fig. 45 *boharti* Irwin, sp. nov.
- Thorax black or dark brown; frontal callosity (♀) as in Fig. 15; ventral gonocoxal spur and gonostylus (♂) as in Fig. 47 *rupina* Irwin, sp. nov.

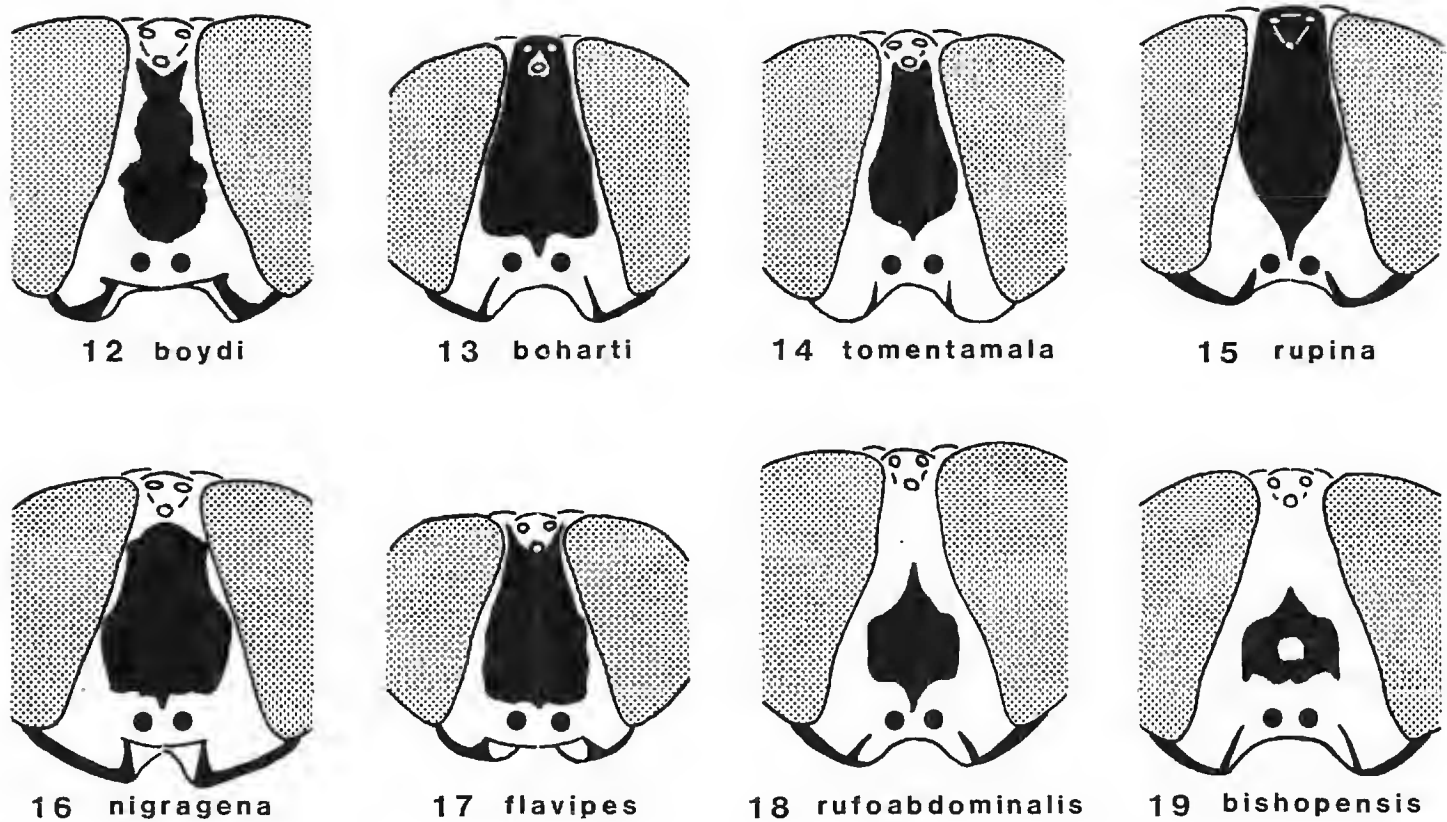
***Pherocera bishopensis* Irwin, Sp. Nov.**

(Figs. 19, 26, 34, 43, 51, 58)

Derivation of name.—Bishop = type locality; *-ensis* (Latin) = of or from.*Diagnosis.*—*P. bishopensis* can be distinguished from all other species of the *boharti* group by the following combination of characters: mesonotal vittae indistinct, abdominal coloration red, frontal callosity of female not reaching ocellar tubercle and having a tomentose area within the bounds of the frontal callosity (Fig. 19); male terminalia with hypoproct as in Fig. 43 and ventral gonocoxal spur and gonostylus as in Fig. 51.*Description, female holotype.*—See Table 1 for holotype measurements, Table 2 for discrete character states.

Head: Dark brown. Face and frontal callosity as in Fig. 19. Tomentum silver-gray on vertex and upper frons, brownish above frontal callosity, silver on lower frons and gena. Pile lacking on ocellar tubercle; sparse, short, white dorsolaterad of antennal socket; sparse, longer on lower gena and palp. Ratio of antennal scape: pedicel: flagellum, 15:9:32; scape reddish-tan with two black setae ventrad, reddish-tan pile sparsely over entire segment; pedicel dark brown with short, white pile forming ring distally; flagellum (Fig. 26) dark brown, bare. Palp (Fig. 34) light brown, nearly translucent. Proboscis dark brown.

Thorax: Dark brown; mesonotal vittae indistinct but discernible; tomentum gray-brown, moderately dense on mesonotum, very dense on scutellum; meso-



Figs. 12-19. Heads of females of *Pherocera boharti* group, frontal views. 12, (2794); 13, (2800); 14, (1670); 15, (2808); 16, (2796); 17, (2831); 18, (2806); 19, (2804). Scale = 0.5 mm.

notal pile very short, light colored, sparse, present only posteriorly; pile short, sparse on scutellum; pleural region sparsely silver tomentose, even sparser on anepimeron and katatergite; coxae mostly red with proximal $\frac{1}{2}$ of hindcoxa and most of forecoxa dark brown; legs mostly red with forefemur, distal $\frac{1}{6}$ of foretibia, and all tarsi dark brown; pile on legs sparse, white.

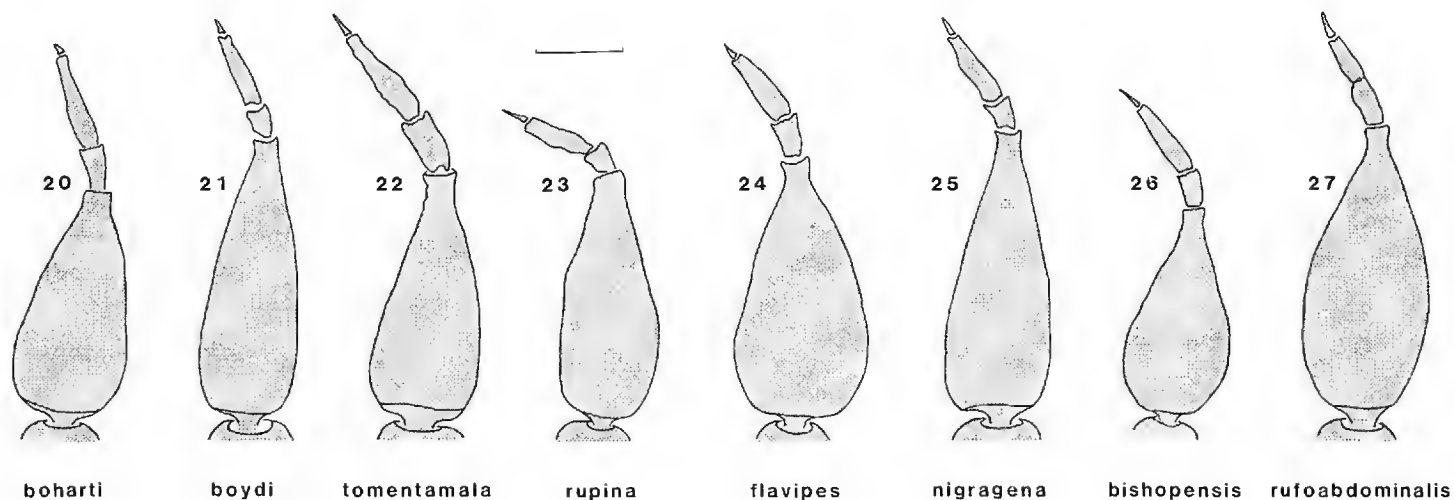
Abdomen: Cuticular coloration red; tomentum almost nonexistent, gray, sparse dorsally and centrally; pile short, evenly covering abdomen, white anteriorly and ventrally to black posteriorly; tergites I-IV fasciate.

Male.—Same as female holotype except as follows: pile short, black on ocellar tubercle; frons silver tomentose, pile on mesonotum white, short anteriorly to long posteriorly, even longer on scutellum; scape dark brown; coxae dark brown; distal sixth of middle and hindtibiae dark brown; distal third of foretibia dark brown; abdomen with a single mid-dorsal dark brown blotch on each of tergites I-IV; tergites I-III, faintly IV, fasciate; aedeagus as in Fig. 58; hypoproct as in Fig. 43; ventral gonocoxal spur and gonostylus as in Fig. 51.

Variation.—Overall length 3.6 mm to 5.1 mm ♂; 4.1 mm to 6.3 mm ♀; tergites I-II to I-IV fasciate; one specimen has a more intensely yellow palp and more intensely orange abdomen than other examined specimens; some have dark blotches on dorsal midline of tergites.

Distribution and ecological placement.—*P. bishopensis* appears to be restricted to dry washes and desert canyon bottoms where *Populus* spp. abound in the Owens Valley (Inyo and Mono Counties) and the Mojave Desert (Los Angeles and Kern Counties), California.

Specimens examined.—Holotype: ♀, Irwin specimen number 2804, CAS type no. 10454; 4.8 kilometers south of Bishop (label reads Bishop), Inyo Co., California; EIS; July 20, 1960; under *Populus trichocarpa* Torrey & Gray. Paratopo-



Figs. 20-27. Antennal flagella of males of *Pherocera boharti* group, lateral view. 20, (1633); 21, (1523); 22, (1669); 23, (1807); 24, (1192); 25, (1594); 26, (2714); 27, (2453). Scale = 0.1 mm.

types: 85 ♂; 64 ♀. Other specimens: 1 ♂; 2 ♀. The following specimens were examined:

CALIFORNIA: Inyo Co.: Bishop, 4.8 km S, 1265 m, 60/07/20, EIS, 85 ♂, 65 ♀; Kern Co.: Walker Pass, 1585 m, 58/08/19, RHP EMP, 1 ♂; Los Angeles Co.: Lancaster, 12.9 km E, 56/09/06, EIS, 1 ♀; Mono Co.: Benton Station, 50/07/20, HAH, 1 ♀.

Comments.—Morphological separation of some males of *P. bishopensis* and *P. rufoabdominalis* is difficult. Female frontal callosity, ecological associations, and distribution patterns all help separate this species from *P. rufoabdominalis*, its sister species.

***Pherocera boharti* Irwin, SP. NOV.**

(Figs. 13, 20, 28, 37, 45, 52)

Derivation of name.—Named in honor of Dr. Richard M. Bohart.

Diagnosis.—This species can be distinguished from all others in the *boharti* group by the following combination of characters: frontal callosity (♀) as in Fig. 13; thorax orange; mesonotal vittae indistinguishable; male terminalia with hypoproct as in Fig. 37 and ventral gonocoxal spur and gonostylus as in Fig. 45.

Description, female holotype.—See Table 1 for holotype measurements, Table 2 for discrete character states.

Head: Face and frons similar to Fig. 13, slightly less tomentum on frons. Light brown from midfrons down, dark brown above. Tomentum dense, silver throughout; pile lacking on ocellar tubercle; white, moderately long dorsolaterad of antennal socket; sparse, moderately long, white posterior of genal stripe. Ratio of antennal scape : pedicel : flagellum, 17:7:34; scape with one short, black seta ventrad, white pilose; pedicel with distal ring of white and black pile; flagellum (Fig. 20) bare; antennae dark brown; palp (Fig. 28) light brown; proboscis dark brown.

Thorax: Orange; mesonotal vittae indiscernible; tomentum extremely sparse, gray, not obliterating ground color; pile black, sparse over mesonotum and scutellum; pleural region sparsely silver tomentose on anepisternum, katepisternum, katepimeron and metanepisternum; lacking on anepimeron and katatergite; anepisternum sparsely short, white tomentose; katatergite with sparse, tan and elongate tomentum; coxae orangish-tan, silver tomentose, white pilose; legs orange

with proximal 1/2 of hindtibia light brown and distal 1/2 dark brown, forecoxa and femur brown, distal 1/2 of midtibia brown, proximal 2/3 of foretibia white, distal 1/3 dark brown; all tarsi dark brown; wing veins brown.

Abdomen: Tan, darker brown dorsally; tomentum absent; pile short, black, appressed mesally; tergites I–II, faintly IV, fasciate.

Male.—Same as female holotype except as follows: antennal scape with two black setae ventrad; pile short, black on ocellar tubercle; tomentum white on anterolateral margins of mesonotum; tomentum golden on scutellum; hindcoxa and trochanter dark brown; midtrochanter dark brown; abdomen dark brown; abdominal pile long, white, erect laterally, shorter, black, appressed ventrally and dorsally; aedeagus as in Fig. 52; hypoproct as in Fig. 37; ventral gonocoxal spur and gonostylus as in Fig. 45.

Variation.—Overall length 3.6 mm to 5.0 mm ♂; 4.2 mm to 5.2 mm ♀; one female with black pile on ocellar tubercle; abdomen of female sometimes darker.

Distribution.—*P. boharti* has been collected from the transverse mountain range including the San Gabriel Mountains in Los Angeles County and the San Bernardino Mountains in San Bernardino County, California, in association with oak-woodland leaf litter. A small series was collected by RMB near Warner Springs, San Diego County, California. It was subsequently learned (R. M. Bohart, pers. comm.) that the collector had just recently come from the San Gabriel Mountains and had collected the specimens from inside the car. It is possible that these specimens were transported by car from the Tanbark Flat area to Warner Springs.

Specimens examined.—Holotype: ♀, Irwin specimen number 1624, CAS type no. 10455; Wildwood Canyon, 8 km east of Calimesa, San Bernardino Co., California, MEI; July 12, 1965; on wet sand near watering trough. Paratopotypes: 1 ♂; 23 ♀. Other paratypes: 4 ♂; 5 ♀. Other specimens: 6 ♀. The following specimens were examined:

CALIFORNIA: Los Angeles Co.: Big Dalton Canyon, 52/07/23, ATM, 1 ♂, 1 ♀; Glendale, 54/08/25, EIS, 1 ♂; 56/07/29, 1 ♀; San Francisquito Canyon, 56/07/15, LAS, 2 ♀; Tanbark Flat, 56/07/14, RMB, 1 ♂, 1 ♀. **San Bernardino Co.:** Calimesa, 8 km E at Wildwood Canyon, 57/07/09, HRM, 1 ♀; 57/07/13, JCH, 1 ♂; HRM, 2 ♀; 58/07/07, HRM, 2 ♀; 65/07/10, MEI, 2 ♀; 65/07/12, MEI, 13 ♀; 68/07/24, MEI, 4 ♀; Camp Baldy, 4.8 km W, 65/09/09, MEI, 1 ♂; Mountain Home, 44/08/24, ALM, 2 ♀. **San Diego Co.:** Warner Springs, 14.5 km S (*Sic!* see text), 56/07/08, RMB, 4 ♀.

***Pherocera boydi* Irwin, Sp. Nov.**

(Figs. 12, 21, 29, 36, 44, 53)

Derivation of name.—Named in honor of Mr. Philip L. Boyd who donated land that now forms the Deep Canyon Desert Research Center of the University of California, Riverside campus.

Diagnosis.—*P. boydi* can be distinguished from all other members of the *boharti* group by the following combination of characters: frontal callosity (♀) as in Fig. 12; mesonotum with indistinct vittae, heavily powdered over with silver to silver-gray tomentum; male terminalia with large hypoproct (Fig. 36) and unique-shaped ventral gonocoxal spur (Fig. 44).

Description, female holotype.—See Table 1 for holotype measurements, Table 2 for discrete character states. Body medium brown.

Head: Face similar to Fig. 12, frontal callosity fuller, rounder, extending through ocellar tubercle; tomentum gray near vertex, silver-gray on upper frons, silver on lower frons and gena; pile absent on ocellar tubercle, short, white dorsolaterad of antennal socket, absent on gena except short, white posterior to genal stripe; ratio of antennal scape : pedicel : flagellum, 15:7:35; scape with two long black setae ventrad, light brown pile overall; pedicel with distal ring of light tan pile; flagellum similar to Fig. 21, bare; antenna dark brown, brown tomentose; palp (Fig. 29) and proboscis dark brown.

Thorax: Mesonotal vittae indistinct but discernible, densely powdered over with silver-gray tomentum; tomentum covering scutellum; pile very short, sparse over mesonotum and scutellum; pleural region densely silver-gray tomentose on anepisternum, katepisternum, katepimeron, and metanepisternum, lacking on anepimeron and katatergite; anepisternum and katatergite with sparse, long, white pile; coxae reddish brown, silver-gray tomentose, white pilose; middle and hind-legs mostly orange or tannish-orange; foreleg black except proximal $\frac{2}{3}$ of tibia whitish.

Abdomen: Tomentum lacking; pile short, white (some black), more or less erect, covering entire abdomen; tergites I-IV fasciate.

Male.—Same as female holotype except as follows: light tan pile on ocellar tubercle; pile posterior to genal stripe longer and whiter; mesonotum more densely silver tomentose, short, white pilose; white pile on scutellum longer; white pile on abdomen much longer on tergites; tergites I-II, III faintly fasciate; aedeagus as in Fig. 53; hypoproct as in Fig. 36; ventral gonocoxal spur and gonostylus as in Fig. 44.

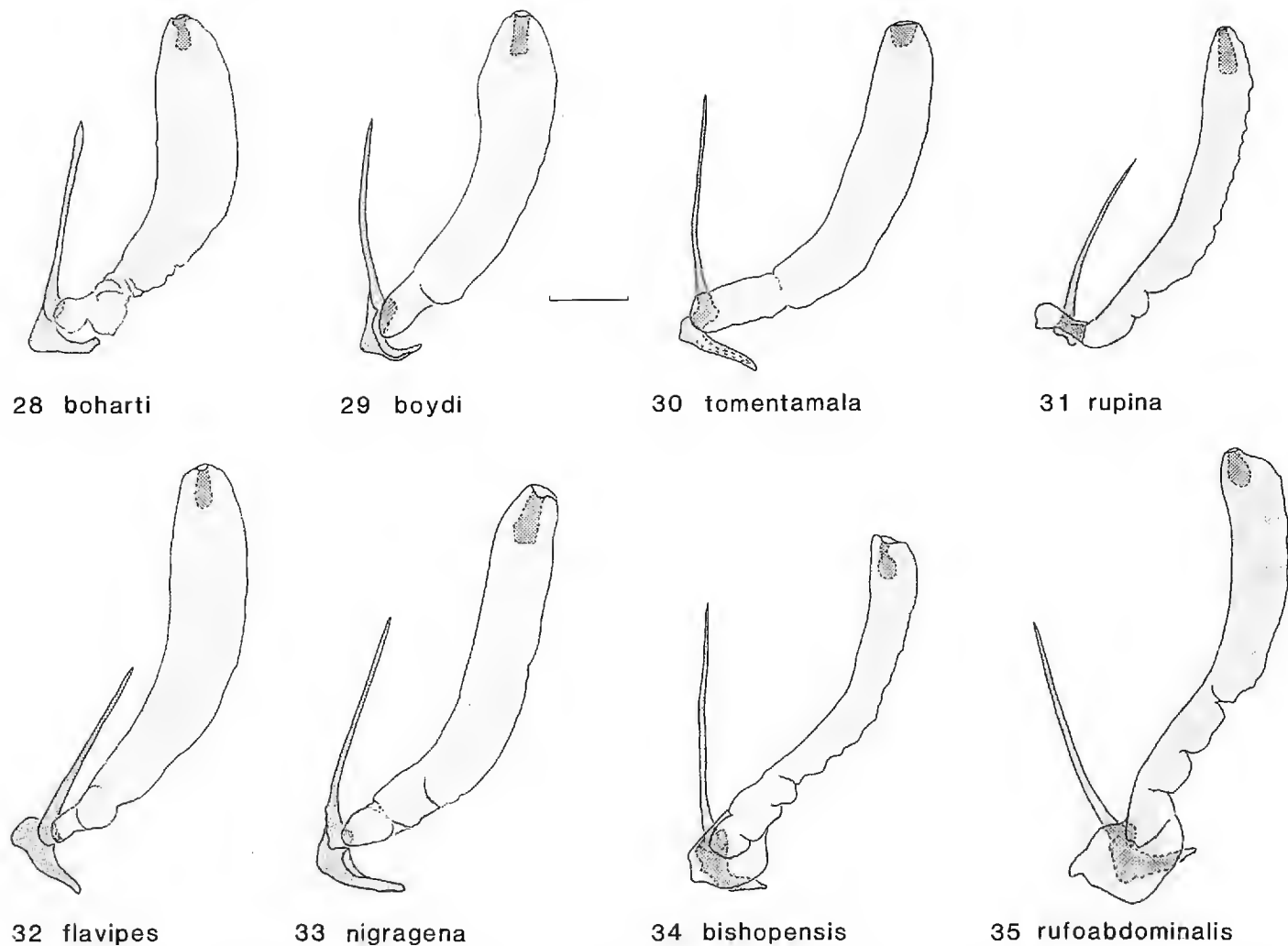
Variation.—Overall length 3.4 mm to 4.5 mm δ ; 4.0 mm to 5.4 mm ♀ ; female frontal callosity variable, more bulbous on lower frons, narrowing on upper frons; coxae and trochanter of male often black.

Distribution and ecological placement.—*P. boydi* seems restricted to desert canyon bottom environments, often in association with rock substrates under desert willow, *Chilopsis linearis* (Cavanilles). It has been collected from the San Jacinto, Santa Rosa, and Little San Bernardino Mountains, Riverside County; from the Daggett Hills, San Bernardino County; from the eastern foothills of the White Mountains, Inyo County, California; from Gila County, Arizona; from Hidalgo County, New Mexico; and from the eastern slope of the Sierra Juarez, Baja California Norte, Mexico.

Specimens examined.—Holotype: ♀ , Irwin specimen number 1537, CAS type no. 10456; P. L. Boyd Deep Canyon Desert Research Center, 6.4 km south of Palm Desert, Riverside Co., California; EIS; July 1, 1964; under *Chilopsis* in lower part of canyon. Paratopotypes: 18 δ ; 17 ♀ . Other specimens: 8 δ ; 8 ♀ . The following specimens were examined:

MEXICO: Baja California Norte: Guadalupe Canyon, 365 m, 67/07/11, MEI, 1 δ .

USA-ARIZONA: Gila Co.: San Carlos, 18/05/12, JCB, 1 ♀ . **Maricopa Co.:** Canyon Lake, 58/05/30, JCH, 1 δ . **CALIFORNIA: Inyo Co.:** Antelope Springs, 60/06/19, HKC, 1 δ , 6 ♀ . Westgard Pass, 6.4 km W, 61/06/19, JAP, 1 δ . **Riverside Co.:** Massacre Canyon, 64/07/29, MEI, 1 δ ; P. L. Boyd Deep Canyon Desert Research Center, 6.4 km S of Palm Desert, 320 m, 63/05/15, EIS, 1 δ ; 63/06/21, EIS, 2 δ , 1 ♀ ; 64/05/19, MEI, 1 ♀ ; 64/06/24, EIS, 2 δ , 2 ♀ ; 64/07/01, GRB, 1 δ ;



Figs. 28–35. Palps of males of *Pherocera boharti* group, lateral view. 28, (1633); 29, (1523); 30, (1669); 31, (1807); 32, (1409); 33, (1594); 34, (2714); 35, (2453). Scale = 0.1 mm.

EIS, 1 ♀; 65/06/08, MEI, 1 ♂; 67/05/19, MEI, 1 ♂; 69/05/18, MEI, 1 ♀; 69/05/21, MEI, 1 ♀; 69/05/24, MEI SIF, 4 ♂, 4 ♀; 69/06/15, SIF RMW, 3 ♀; 69/06/23, SIF RMW, 1 ♂; 69/06/28, SIF RMW, 1 ♂; 69/06/29, SIF RMW, 1 ♀; 69/07/03, SIF RMW, 2 ♀; 69/07/05, SIF RMW, 1 ♂; 65/06/08, MEI, 1 ♂; **373 m**, 65/06/08, MEI, 1 ♀; **381 m**, 69/06/29, SIF, 1 ♂; Whitewater Canyon, 63/07/26, EIS, 2 ♂. **San Bernardino Co.:** Daggett, 55/05/22, WRM, 1 ♀. **NEW MEXICO: Hidalgo Co.:** Rodeo, 8 km N, **1380 m**, 65/06/01, MEI, 1 ♂.

***Pherocera flavipes* Cole**

(Figs. 17, 24, 32, 41, 48, 56)

Pherocera flavipes Cole, 1923a, Proc. U.S. Natl. Mus. 62(4):22.

Derivation of name. —*flavus* (Latin) = yellow; *pes* (Latin) = foot.

Diagnosis. —*P. flavipes* can be distinguished from all other species in the *boharti* group by the following combination of characters: female frontal callosity occupying nearly all of frons (Fig. 17); cuticular coloration usually black; mesonotal vittae usually distinct; palp dark brown; middle and hindfemora and tibiae usually orange; antennal flagellum as in Fig. 24; palp as in Fig. 32; male terminalia with aedeagus as in Fig. 56, ventral gonocoxal spur and gonostylus as in Fig. 48, and hypoproct as in Fig. 41.

Description, female. —(Comments on holotype): This species was adequately described by Cole (1923a, pp. 22–23) except as follows: length 5.3 mm; both antennal styli are entire; coxae partly orange, partly brown.

Male.—Similar to female holotype (see Cole, 1923a) except as follows: pile short, black on ocellar tubercle, white dorsolaterad of antennal socket, longer, white posterior to genal stripe; ratio of antennal scape : pedicel : flagellum, 18:3:39; scape with four black setae ventrad and white pile; pedicel with distal ring of white pile; flagellum bare; palp and proboscis dark brown; mesonotal vittae distinct, black, silver tomentose; mesonotal pile long, white; tarsi dark brown; abdomen black, white pilose, not tomentose; aedeagus as in Fig. 56; hypoproct as in Fig. 41; ventral gonocoxal spur and gonostylus as in Fig. 48.

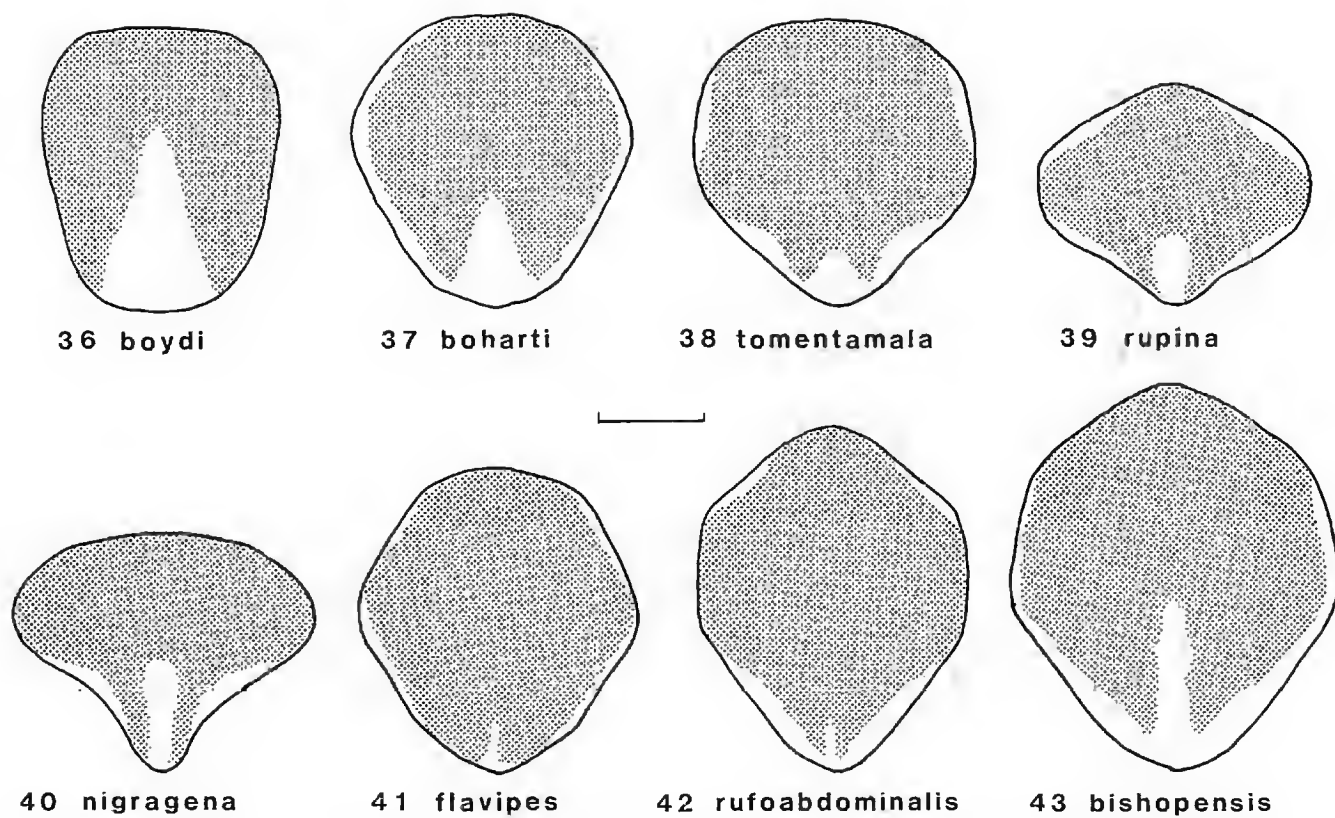
Variation.—Overall length 3.7 mm to 5.3 mm ♂; 4.1 mm to 5.9 mm ♀; the Wildwood Canyon, San Bernardino County, California population has the mesonotal vittae discernible but not distinct. The shape of the antennal flagellum varies from pear-shaped to elongate pear-shaped. *P. flavipes* is a variable species with rather indistinct and usually inseparable populations.

Distribution and ecological placement.—This species inhabits montane and desert canyon bottom environments where adults are often found on rock substrates. It has been collected from Arizona, California, Idaho, Nevada, New Mexico, and Utah in the United States; Baja California Norte and Baja California Sur in Mexico. *P. flavipes* has the widest distribution of all species of *Pherocera*.

Specimens examined.—Holotype: ♀, USNM: Higley (not Highley as reported by Cole, 1923a), Superstition Mountain, Pinal Co., Arizona; EGH; June 13, 1917. Other specimens: 132 ♂; 227 ♀. The following specimens were examined:

MEXICO: Baja California Norte: La Rumorosa, 14.5 km S, 1370 m, 67/07/08, MEI, 1 ♀. **Baja California Sur:** Isla Cerralvo, Gordas Point, 53/03/20, PHA, 1 ♀. Guadalupe, 100 km NW of La Paz, 107 m, 68/04/20, MEI, 6 ♂, 1 ♀. Loreto, 14.5 km S, 18 m, 68/04/17, MEI, 1 ♀. San Ignacio, 4.8 km E, 170 m, 68/04/14, MEI, 4 ♂, 2 ♀. Santa Rosalia, 40 km S, 61 m, 68/04/15, MEI, 1 ♂, 1 ♀.

USA—ARIZONA: Pima Co.: Alamo Canyon, Oregon Pipe National Monument, 47/04/16, ALM, 6 ♀. **CALIFORNIA: Inyo Co.:** Antelope Springs, 61/06/14, CAT, 1 ♂; 61/07/01, JAP, 1 ♂; 66/07/09, HKC, 1 ♀; Batchelder Spring, 67/07/21, MEI, 1 ♂, 7 ♀; Mountain Springs Canyon, Argus Mountains, 59/06/27, JCD, 4 ♂, 6 ♀; WCF, 1 ♂. **Lassen Co.:** Hallelujah Junction, 49/07/04, JWM, 1 ♀; 54/07/12, RMB, 1 ♀. **Los Angeles Co.:** Crystal Lake, 56/06/28, RCB, 1 ♀. **Napa Co.:** Monticello Dam, 62/09/15, MEI, 1 ♂. **Riverside Co.:** Massacre Canyon, 64/07/29, MEI, 1 ♀. Millard Canyon, 63/06/20, EIS, 1 ♀. P. L. Boyd Deep Canyon Desert Research Center, 6.4 km S of Palm Desert, 63/04/13, WAS, 1 ♂; 64/05/19, MEI, 2 ♂; 69/06/07, SIF, 1 ♂; 69/06/13, SIF, 1 ♂; 320 m, 64/05/19, MEI, 1 ♂; 64/05/31, MEI, 1 ♀; 65/05/24, MEI SIF, 2 ♂, 10 ♀; 65/06/08, MEI, 1 ♂; 69/05/16, MEI, 3 ♂; 69/05/17, JRQ, 1 ♂; 69/05/18, MEI, 13 ♂, 4 ♀; 69/06/10, SIF, 1 ♀; 69/06/15, SIF RMW, 1 ♂; 343 m, 64/05/19, MEI, 6 ♂, 2 ♀; 64/05/31, MEI, 1 ♀; 65/04/28, MEI, 1 ♂; 67/05/02, MEI, 5 ♀; 350 m, 65/06/08, MEI, 1 ♂; 366 m, 67/05/19, MEI, 1 ♂, 4 ♀; 373 m, 65/04/28, EIS, 1 ♂; 65/06/08, MEI, 1 ♂; 67/05/02, MEI, 1 ♀; 381 m, 63/05/03, EIS, 3 ♂; 63/05/17, EIS, 1 ♂; 63/06/21, EIS, 2 ♂; 65/06/08, MEI, 1 ♂; 67/05/19, MEI, 1 ♀; 400 m, 63/05/03, EIS, 6 ♀; 63/05/30, EIS, 1 ♀; 63/06/21, EIS, 2 ♀; 64/05/19, MEI, 5 ♂, 1 ♀; 64/05/31, MEI, 4 ♂, 1 ♀; 65/04/28, EIS, 1 ♂; MEI, 3 ♂, 3 ♀; 67/05/02, MEI, 1 ♂; 420 m, 65/04/28, EIS, 1 ♂; 67/05/19, MEI, 1 ♂; 1036 m, 65/06/11, MEI, 3 ♂, 8 ♀; EIS, 1 ♀; Palm Springs, Andreas Canyon, 55/05/03, WRM, 1 ♀; Pinon Flat, 48/05/26, AFH, 1 ♂; Thousand Palms Canyon, Willis Oasis, 55/04/12, WRM, 1 ♂; Whitewater Canyon, 63/06/07, EIS, 1 ♀; Winchester, 67/06/20, WI, 1 ♀; 67/06/23, WI, 2 ♀; 68/06/20, WI, 1 ♂, 1 ♀. **San Bernardino**



Figs. 36–43. Hypoprocts of male genitalia of *Pherocera boharti* group, dorsal view. 36, (1519); 37, (1635); 38, (1669); 39, (1787); 40, (1594); 41, (1192); 42, (3209); 43, (2639). Scale = 0.1 mm.

Co.: Calimesa, 8 km E at Wildwood Canyon, 57/07/09, HRM, 2 ♀; 57/07/13, JCH, 4 ♂, 1 ♀; HRM, 2 ♀; 65/07/10, MEI, 4 ♂, 59 ♀; RES, 10 ♀; 65/07/12, MEI, 17 ♂; 65/09/12, MEI, 1 ♂; 67/06/04, MEI PAR, 1 ♀; 68/07/24, MEI, 4 ♀; Camp Baldy, 4.8 km W, 65/09/09, MEI, 1 ♂; Daggett, 55/05/22, WRM, 4 ♂, 6 ♀; Helendale, 55/05/21, WRM, 1 ♀; **San Diego Co.:** Borrego Springs, 45/05/03, ALM, 1 ♀; 55/04/27, PDH, 1 ♀; 57/04/18, EIS, 2 ♂, 3 ♀; 57/04/19, JCH, 2 ♂, 1 ♀; RMB, 5 ♀; 60/04/21, JFL, 1 ♀; Culp Canyon, Anza-Borrego State Park, 58/06/12, EIS, 3 ♂, 8 ♀; JCH, 10 ♀; HRM, 5 ♀. **Ventura Co.:** Dry Canyon, 14.5 km E, 57/07/26, RAS, 1 ♀. **IDAHO: Twin Falls Co.:** Buhl, 32/07/08, DEF, 1 ♂. **NEVADA: Clark Co.:** Charleston Mountains at Willow Creek, 54/07/01, EIS, 2 ♂, 2 ♀; JWM, 1 ♂, 1 ♀. **NEW MEXICO: Hidalgo Co.:** Rodeo, 24 km N, 1380 m, 65/06/01, MEI, 1 ♂, 1 ♀; Rodeo, 8 km N, 1380 m, 65/06/01, MEI, 1 ♀. **UTAH: Grand Co.:** Arch Canyon, 35/06/23, CTB, 1 ♀; Browns Park, W of, 46/06/23, MTJ, 1 ♂; Castle Valley, 63/06/09, WJH, 1 ♂.

***Pherocera niragena* Irwin, SP. NOV.**

(Figs. 16, 25, 33, 40, 49, 57)

Derivation of name.—*nigra* (Latin) = black; *gena* (Latin) = cheek.

Diagnosis.—*P. niragena* can be distinguished from all other species of the *boharti* group by the following combination of characters: female frontal callosity as in Fig. 16; mesonotum with vivid and distinct vittae; cuticular coloration of both mid and hindfemora mostly black or dark brown; midtibia mostly orange; cuticular coloration of palp dark brown; male terminalia with hypoproct as in Fig. 40 and ventral gonocoxal spur and gonostylus as in Fig. 49.

Description, female holotype.—See Table 1 for holotype measurements, Table 2 for discrete character states. Body black, silver tomentose.

Head: Face and frons similar to Fig. 16; frontal callosity narrow, tapering gradually from base to anterior ocellus. Pile absent on ocellar tubercle; sparse, white dorsolaterad of antennal socket; short, white posterior to genal stripe; white, longer, on palp. Ratio of antennal scape : pedicel : flagellum, 20:9:38; scape with three large, black setae lateroventrad, white pilose; pedicel with distal ring of short black pile; flagellum similar to Fig. 25; bare, antenna black; palp (Fig. 33) and proboscis dark brown.

Thorax: Mesonotal vittae distinct; mesonotal pile short, black; pleural region tomentose except for katatergite and anepimeron; anepisternum and katatergite densely long, white pilose; coxae tomentose, white pilose; legs black with distal $\frac{1}{4}$ of femora and proximal $\frac{1}{3}$ of tibiae of mid and hindlegs orange; distal $\frac{1}{10}$ of femur and proximal $\frac{1}{10}$ of tibia of foreleg orange; remainder of foretibia white and densely white pilose; legs predominantly black pilose.

Abdomen: Tomentum absent; tergite 1 with long, white pile; rest of abdomen short, black pilose; tergites I-III fasciate.

Male.—Same as female holotype except as follows: abdominal pile long, white laterad; shorter, dark, dorsad and ventrad. Aedeagus as in Fig. 57; hypoproct as in Fig. 40; ventral gonocoxal spur and gonostylus as in Fig. 49.

Variation.—Overall length 4.2 mm to 5.5 mm δ ; 4.2 mm to 6.2 mm ♀ ; legs of some specimens with slightly more orange to almost no orange.

Distribution and ecological placement.—*P. nigragena* was collected in dry montane environments characterized by cold winters and cool summers; most of the specimens collected by the author were associated with rock substrates under willow trees (*Salix* spp.). It has been collected in the more northern areas of California (Inyo, Mono, and Modoc Counties; with a single specimen from Victorville, Los Angeles County) and Nevada (Mineral and Washoe Counties).

Specimens examined.—Holotype: ♀ , Irwin specimen number 1578, CAS type no. 10470; Batchelder Spring, Inyo Co., California; MEI; July 21, 1967; under *Salix* on rock. Paratopotypes: 3 ♀ . Other paratypes: 3 δ , 18 ♀ . Other specimens: 10 δ , 10 ♀ . The following specimens were examined:

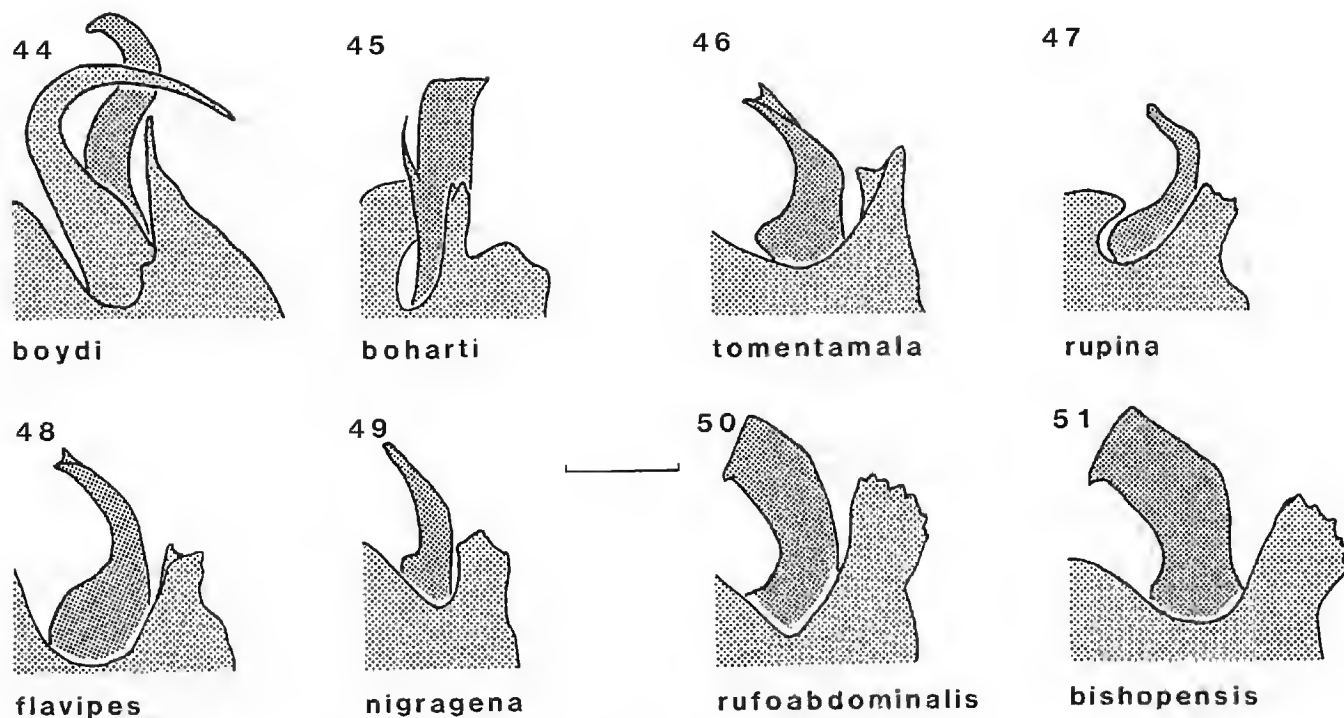
CALIFORNIA: Inyo Co.: Antelope Springs, 1675 m, 60/06/19, HKC, 4 δ , 14 ♀ ; 60/06/20, HKC, 1 δ , 2 ♀ ; 65/07/02, MEI, 3 δ , 4 ♀ ; 67/07/21, MEI, 1 δ ; Batchelder Spring, 67/07/10, RMB, 1 ♀ ; 67/07/21, MEI, 3 ♀ ; Big Pine, 57/07/06, JW, 1 δ ; Lone Pine, 1.6 km N, 64/06/12, MEI, 1 ♀ ; Westgard Pass, 9.7 km E, 65/07/01, MEI, 1 ♀ . Modoc Co.: Canby, NW of, 60/06/24, EIS, 1 ♀ . Mono Co.: Topaz Lake, 57/06/26, JWM, 2 δ . San Bernardino Co.: Victorville, 44/05/30, ALM, 1 δ . NEVADA: Mineral Co.: Basalt, 6.4 km S, 65/07/01, MEI, 5 ♀ . Washoe Co.: Patrick, 64/06/30, FDP, 1 δ .

***Pherocera rufoabdominalis* Irwin, Sp. Nov.**

(Figs. 6-11, 18, 27, 35, 42, 50, 59)

Derivation of name.—*rufus* (Latin) = red or reddish; *abdomen* (Latin) = belly.

Diagnosis.—*P. rufoabdominalis* can be distinguished from all other species of the *boharti* group by the following combination of characters: abdomen red; mesonotal vittae indistinct; female frontal callosity as in Fig. 18, not reaching ocellar tubercle and being entirely bare (tomentose area only within callosity of *P. bishopensis* females); male terminalia with hypoproct as in Fig. 42 and ventral gonocoxal spur as in Fig. 50.



Figs. 44–51. Ventral gonocoxal spurs on outer lateroventral portions of gonocoxites (light shading) and gonostyli (dark shading) of male genitalia of *Pherocera boharti* group, ventrolateral view. 44, (1519); 45, (1635); 46, (1669); 47, (1787); 48, (1192); 49, (1594); 50, (3209); 51, (2639). Scale = 0.1 mm.

Description, female holotype.—See Table 1 for holotype measurements, Table 2 for discrete character states. Also see diagnosis of *boharti* group.

Head: Black; face and frons similar to Fig. 18; tomentum silver-gray on vertex and upper frons, silver on central and lower frons and gena. Pile lacking on ocellar tubercle; sparse, short, white dorsolaterad of antennal socket and lower gena, longer on palp. Ratio of antennal scape : pedicel : flagellum, 14:7:34; scape with two black setae ventrad; sparse, white pile over entire surface; pedicel with short, white pile forming distal ring; flagellum similar to Fig. 27, bare; entire antenna dark brown with whitish to light brown tomentum; palp (Fig. 35) light brown, translucent; proboscis dark brown.

Thorax: Black; mesonotal vittae indistinct but easily discernible; tomentum gray to gray-brown, denser on scutellum than mesonotum; mesonotal pile not evident on anterior portion, very sparse, white posteriorly, sparse on scutellum; pleural region densely silver tomentose except for katatergite and anepimeron; fine white pile on anepisternum and katatergite; coxae dark brown, silver tomentose and white pilose except for red cuticular coloration on distal $\frac{2}{3}$ of middle and distal $\frac{1}{4}$ of hindcoxae; legs red with femur, distal $\frac{1}{4}$ of tibia (proximal $\frac{3}{4}$ of tibia white), tarsus of foreleg, tarsus of midleg, and distal $\frac{1}{6}$ of tibia and tarsus of hindleg dark brown. Pile on legs white; wing veins brown.

Abdomen: Red; tomentum gray, almost nonexistent; pile short, white anteriorly to black posteriorly; tergites I–III fasciate.

Male.—Same as female holotype except as follows: pile short, black on posterior edge of ocellar tubercle; frons silver tomentose; mesonotum short, white pilose; pile longer, denser on scutellum; palp medium brown; coxae black; distal $\frac{1}{6}$ of middle tibia and distal $\frac{1}{4}$ of hindtibia dark brown. Aedeagus as in Fig. 59; hypoproct as in Fig. 42; ventral gonocoxal spur and gonostylus as in Fig. 50; aedeagus as in Fig. 59.

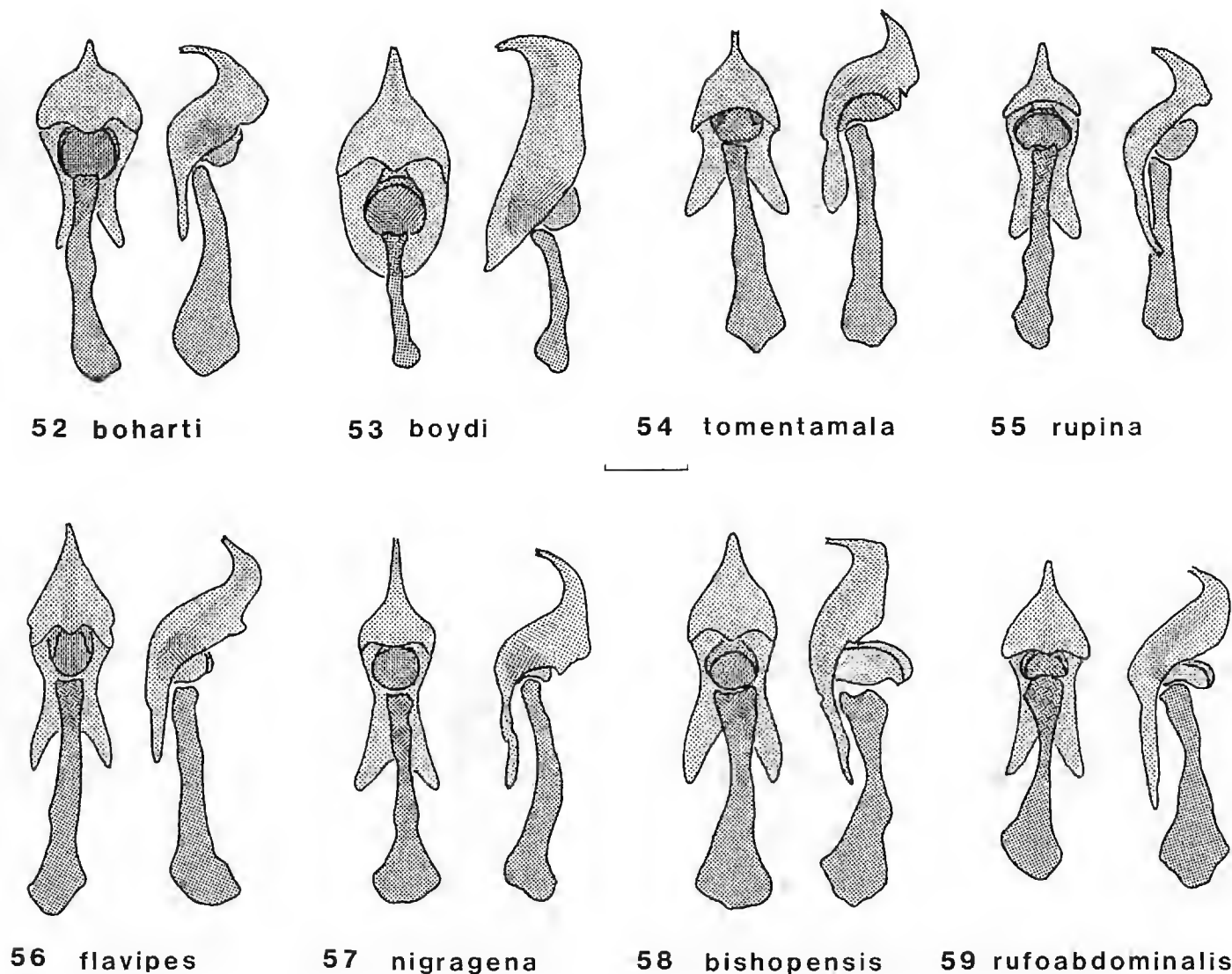
Variation.—Overall length 3.5 mm to 5.4 mm ♂; 3.7 mm to 5.8 mm ♀; with some brown tomentum above and lateral to female frontal callosity; sometimes tergite IV also fasciate.

Distribution and ecological placement.—*P. rufoabdominalis* is generally found within the confines of desert canyon bottom environments, closely associated with rock substrates and, when present, is often found under desert willow (*Chilopsis linearis*). It is found along the eastern side of the San Jacinto and Santa Rosa Mountains, Riverside County, California, the southeastern San Bernardino Mountains, San Bernardino County, California, the Santa Ana Mountains, Orange County, California, and the eastern slope of the Sierra Juarez Mountains, Baja California Norte, Mexico.

Specimens examined.—Holotype: ♀, Irwin specimen number 2626, CAS type no. 10475; P. L. Boyd Deep Canyon Desert Research Center, 6.4 km south of Palm Desert, Riverside Co., California; MEI; July 17, 1965; at Willow Pool (Marker O) on rock under willow tree (*Salix* sp.) in filtered light. Paratopotypes: 129 ♂; 153 ♀. Other topotypes: 119 ♂; 31 ♀. Other specimens: 4 ♂; 4 ♀. The following specimens were examined:

MEXICO: Baja California Norte: La Rumorosa, 14.5 km S, 1372 m, 67/07/08, MEI, 1 ♂.

USA—CALIFORNIA: Kern Co.: Walker Pass, 1585 m, 58/08/19, RHP EMP, 1 ♂. **Orange Co.:** Irvine Lake, 63/09/11, MEI, 1 ♂. **Riverside Co.:** Cottonwood Canyon, 69/07/30, SIF LFL, 1 ♀; P. L. Boyd Deep Canyon Desert Research Center, 6.4 km S Palm Desert, 63/06/21, EIS, 14 ♀; 63/07/11, EIS, 9 ♀; 63/07/26, EIS, 4 ♂, 8 ♀; 63/08/09, EIS, 1 ♂; 63/08/23, EIS, 4 ♂, 6 ♀; 63/09/23, MEI EIS, 1 ♀; 63/09/24, EIS, 3 ♂, 5 ♀; 63/10/09, EIS, 1 ♀; MEI, 3 ♀; 64/07/01, KWB, 1 ♀; 64/09/02, PAR, 5 ♂, 3 ♀; ARG, 1 ♀; 64/09/10, MEI, 1 ♂, 5 ♀; 69/06/07, SIF, 4 ♀; 69/06/13, SIF, 4 ♂, 1 ♀; **320 m**, 64/06/24, EIS, 7 ♂, 5 ♀; 65/06/08, MEI, 1 ♂; 67/10/17, MEI, 1 ♂; 68/11/08, MEI, 6 ♂; 68/11/17, MEI, 3 ♂; 69/05/16, MEI, 1 ♂; 69/05/18, MEI, 7 ♂; 69/05/21, MEI, 1 ♂; 69/05/24, MEI SIF, 4 ♂, 1 ♀; 69/06/10, SIF, 2 ♀; 69/06/15, SIF RMW, 4 ♂, 6 ♀; 69/06/19, SIF RMW, 2 ♂, 1 ♀; 69/06/20, SIF RMW, 1 ♂; 69/06/23, SIF RMW, 2 ♂, 1 ♀; 69/05/25, SIF RMW, 4 ♂, 4 ♀; 69/06/27, SIF RMW, 2 ♂; 69/06/28, SIF RMW, 1 ♂; 69/06/29, SIF RMW, 2 ♂; 69/07/05, SIF RMW, 6 ♂, 1 ♀; 69/07/10, SIF RMW, 5 ♂; 69/07/13, SIF RMW, 1 ♂; 69/07/14, SIF RMW, 1 ♂; 69/07/15, SIF RMW, 1 ♂; 69/07/17, SIF RMW, 2 ♂; 69/07/18, SIF RMW, 6 ♂, 1 ♀; 69/07/22, SIF RMW, 1 ♂; 69/07/23, SIF RMW, 1 ♂; 69/07/25, SIF RMW, 3 ♂; 69/07/27, SIF RMW, 1 ♂; 69/07/29, SIF RMW, 2 ♀; 69/08/01, SIF RMW, 2 ♂, 2 ♀; 69/08/03, SIF RMW, 4 ♂, 3 ♀; 69/08/05, SIF RMW, 2 ♂, 1 ♀; 69/08/06, SIF RMW, 1 ♂; 69/08/09, SIF RMW, 1 ♂; 69/08/12, SIF RMW, 2 ♂, 1 ♀; 69/08/16, SIF RMW, 1 ♂; 69/08/17, SIF RMW, 1 ♂; 69/08/20, SIF RMW, 3 ♂; 69/08/22, SIF RMW, 6 ♂; 69/08/24, SIF RMW, 5 ♂, 1 ♀; SIF JT, 1 ♀; 69/08/25, SIF JT, 1 ♂; 69/08/26, SIF JT, 1 ♂; 69/09/01, SIF JT, 4 ♂; 69/09/05, SIF JT, 16 ♂, 1 ♀; 69/09/07, SIF MEI, 60 ♂, 16 ♀; **335 m**, 64/09/10, EIS, 5 ♂; **366 m**, 64/09/02, MEI, 1 ♂; 64/09/10, MEI, 1 ♂; EIS, 2 ♀; 67/05/19, MEI, 1 ♂; **373 m**, 64/06/24, EIS, 2 ♀; 64/09/02, MEI, 8 ♂, 6 ♀; 64/09/10, MEI, 10 ♂, 3 ♀; 65/06/08, MEI, 1 ♀; 69/08/25, SIF, 2 ♂, 2 ♀; **381 m**, 64/09/02, MEI, 1 ♂, 6 ♀; 64/09/10, MEI, 1 ♂; 69/06/13, SIF, 1 ♂; 69/06/29, SIF, 1 ♀; **400 m**, 64/05/31, MEI, 1 ♀; 64/07/08, EIS, 1 ♀; 65/07/17, MEI, 3 ♂, 3 ♀; 64/09/02, MEI, 1 ♂, 7 ♀; 64/09/10, MEI, 1



Figs. 52–59. Aedeagi of male genitalia of *Pherocera boharti* group, dorsal (left) and lateral (right) views. 52, (1635); 53, (1519); 54, (1669); 55, (1787); 56, (1192); 57, (1594); 58, (2639); 59, (3209). Scale = 0.1 mm.

♀; **410 m**, 64/07/01, EIS, 1 ♂; 64/07/08, EIS, 1 ♂; 64/09/02, MEI, 4 ♂, 8 ♀; **420 m**, 64/07/23, MEI, 1 ♀; **434 m**, 64/09/02, MEI, 4 ♂, 11 ♀; 64/09/10, EIS, 2 ♂, 4 ♀; **1036 m**, 65/06/11, MEI, 2 ♀. **San Bernardino Co.:** Morongo, 44/09/26, ALM, 2 ♀. **San Diego Co.:** Culp Canyon, Anza-Borrego State Park, 58/06/12, EIS, 1 ♀; junction of highways 78 and S2, 65/08/07, SIF SLF SL, 1 ♂.

***Pherocera rupina* Irwin, Sp. Nov.**

(Figs. 1–5, 15, 23, 31, 39, 47, 55)

Derivation of name.—*rupina* (Latin) = rocky chasm.

Diagnosis.—*P. rupina* can be distinguished from all other species of the *boharti* group by the following combination of characters: Palp light brown to tan; female frontal callosity as in Fig. 15; legs almost entirely dark brown to black; male terminalia with hypoproct as in Fig. 39 and ventral gonocoxal spur and gonostylus as in Fig. 47.

Description, female holotype (Fig. 1).—See Table 1 for holotype measurements, Table 2 for discrete character states. Black; silver tomentose; white pilose.

Head: Face and frons similar to Fig. 15; frontal callosity slightly less pointed ventrally; pile absent on ocellar tubercle, short, sparse dorsolaterad of antennal socket, short posterior to genal stripe, longer on palp; ratio of antennal scape: pedicel: flagellum, 16:8:35; scape with two black setae ventrad, pilose; pedicel

sparsely pilose; flagellum similar to Fig. 23, smoother, bare; antenna dark brown; palp (Fig. 31) tan; proboscis black.

Thorax: Mesonotal vittae indistinct but discernible; mesonotal pile short, sparse; pleural region tomentose except for katatergite and anepimeron; anepisternum and katatergite long pilose; coxae tomentose, pilose; legs white pilose, dark brown with proximal $\frac{3}{4}$ of foretibia white; wing veins light brown.

Abdomen: Tomentum absent dorsally, relatively dense ventrally; tergites I-III relatively long pilose and fasciate; rest of abdomen with shorter, sparse pile.

Male.—Same as female holotype except as follows: pile dorsolaterad of antennal socket longer, denser; legs brown or black with foretibia white; pile relatively long on abdominal tergites; aedeagus as in Fig. 55; hypoproct as in Fig. 39; ventral gonocoxal spur and gonostylus as in Fig. 47.

Variation.—Overall length 3.1 mm to 4.7 mm ♂; 3.5 mm to 5.3 mm ♀; genal stripe occasionally lightly powdered with tomentum; the populations from Baja California Sur, Mexico, and some southern California specimens have three or four black setae on antennal scape.

Distribution and ecological placement.—*P. rupina* was collected repeatedly on rock substrates in desert canyon bottom environments in Riverside County, California and in Baja California Sur and Norte, Mexico.

Specimens examined.—Holotype: ♀, Irwin specimen number 1725, CAS type no. 10476; P. L. Boyd Deep Canyon Desert Research Station, 6.4 km south of Palm Desert, Riverside Co., California; MEI; June 8, 1965; at marker 56.8 on rock in filtered light under *Chilopsis*, not near water, in sunny area in light wind. Paratopotypes: 188 ♂; 94 ♀. Other topotypes: 9 ♂. Other specimens: 48 ♂, 13 ♀. The following specimens were examined:

MEXICO: Baja California Norte: San Quintin, inland from, 55/05/25, FXW, 1 ♀. **Baja California Sur:** Guadalupe, 100 km NW of La Paz, 107 m, 68/04/20, MEI, 7 ♂; Loreto, 8 km W, 15 m, 68/04/17, MEI, 1 ♂, Santa Rosalia, 40 km S, 10.7 m, 68/04/15, MEI, 2 ♂.

USA-CALIFORNIA: Riverside Co.: Massacre Canyon at highway 79, 64/07/29, MEI, 25 ♂, 1 ♀; PAR, 5 ♂, 7 ♀; 64/07/30, MEI, 7 ♂; MacCoy Springs, 63/04/08, JCH, 1 ♀; P. L. Boyd Desert Research Center, 6.4 km S of Palm Desert, 63/05/03, EIS, 7 ♂, 6 ♀; 63/05/17, EIS, 5 ♂, 2 ♀; 63/05/30, EIS, 3 ♀; 63/06/21, EIS, 1 ♂; 63/07/11, EIS, 3 ♂, 1 ♀; 63/07/21, EIS, 5 ♂; 63/07/26, EIS, 3 ♂; 63/09/05, EIS, 1 ♀; 63/09/24, EIS, 8 ♂; 64/05/09, MEI, 1 ♂; 64/07/01, KWB, 3 ♂, 1 ♀; 69/06/07, SIF, 4 ♂; 320 m, 64/05/09, MEI, 2 ♂; 64/05/25, MEI, 2 ♂; 64/06/24, EIS, 7 ♀; 64/07/01, EIS, 1 ♀; 64/07/23, MEI, 3 ♂; 64/09/10, MEI, 1 ♂; 65/06/08, MEI, 3 ♂, 5 ♀; 65/07/17, MEI, 1 ♂; 67/10/17, MEI, 2 ♂; 68/09/08, MEI, 4 ♂, 2 ♀; 69/05/18, MEI, 8 ♂, 3 ♀; 69/05/21, MEI, 1 ♂, 2 ♀; 69/05/24, MEI SIF 10 ♂, 7 ♀; 69/06/10, SIF, 2 ♀; 69/06/15, SIF RMW, 2 ♂, 9 ♀; 69/06/19, SIF RMW, 3 ♀; 69/06/20, SIF RMW, 1 ♀; 69/06/23, SIF RMW, 1 ♂, 1 ♀; 69/06/25, SIF RMW, 1 ♀; 69/06/27, SIF RMW, 1 ♂; 69/06/29, SIF RMW, 1 ♂, 1 ♀; 69/07/01, SIF RMW, 2 ♂; 69/07/02, SIF RMW, 1 ♂; 69/07/05, SIF RMW, 2 ♂, 1 ♀; 69/07/10, SIF RMW, 1 ♂; 69/07/13, SIF RMW, 1 ♂; 69/07/15, SIF RMW, 1 ♂; 69/07/22, SIF RMW, 1 ♂; 69/08/24, SIF RMW, 1 ♂; 69/09/07, SIF MEI, 2 ♂; 335 m, 65/06/08, MEI, 2 ♂; 343 m, 64/05/19, MEI, 7 ♀; 64/06/24, EIS, 30 ♂; 64/07/01, EIS, 12 ♂; 64/09/10, MEI, 1 ♂; 65/06/08, MEI, 4 ♂; 350 m, 64/09/10, MEI, 2 ♂; 65/06/08, MEI, 2 ♂; 358 m, 65/06/08, MEI, 1 ♂; 366 m, 63/09/10, EIS, 1 ♂; 64/05/31, MEI, 4 ♂; 64/09/02,

MEI, 4 ♂; 64/09/10, MEI, 2 ♂; 65/06/08, MEI, 1 ♂, 1 ♀; **373 m**, 64/05/19, MEI, 3 ♀; 64/05/31, MEI, 1 ♀; 64/09/02, MEI, 2 ♀; 64/09/10, MEI, 2 ♂, 3 ♀; 65/06/08, MEI, 1 ♂; **381 m**, 64/09/02, MEI, 1 ♂; **400 m**, 64/05/09, MEI, 8 ♂; 64/05/19, MEI, 4 ♀; 64/06/24, EIS, 1 ♀; 64/07/08, EIS, 7 ♂, 2 ♀; 64/09/02, MEI, 2 ♀; 65/04/28, MEI, 1 ♂; 65/06/08, MEI, 2 ♀; 65/07/17, MEI, 3 ♂; **412 m**, 64/05/31, MEI, 5 ♂; 64/07/01, EIS, 1 ♂; 64/07/08, EIS, 6 ♂; **420 m**, 67/05/19, MEI, 2 ♀; **434 m**, 64/09/02, MEI, 1 ♀; 64/09/10, EIS, 1 ♀. Winchester, 68/06/20, WI, 1 ♀. **San Diego Co.:** Culp Canyon, Anza-Borrego State Park, 58/06/26, EIS, 1 ♀.

Pherocera tomentamala Irwin, SP. NOV.

(Figs. 14, 22, 30, 38, 46, 54)

Derivation of name.—*tomentum* (Latin) = wooly hairs; *mala* (Latin) = jaw.

Diagnosis.—*P. tomentamala* can be distinguished from all other species of the *boharti* group by the following combination of characters: female frontal callosity as in Fig. 14; mesonotum with indistinct vittae; genal stripe lacking; male terminalia with hypoproct as in Fig. 38 and ventral gonocoxal spur as in Fig. 46.

Description, female holotype.—See Table 1 for holotype measurements, Table 2 for discrete character states. Dark brown; tomentum silver; pile white.

Head: Face and frons as in Fig. 14; pile lacking on frons, very sparse on posterior portion of lower gena, elongate on palp; ratio of antennal scape : pedicel : flagellum, 15:7:39; scape with two elongate black setae ventrad and white pilose overall; pedicel very sparsely pilose; flagellum similar to Fig. 22; bare; antenna, palp (Fig. 30) and proboscis brown.

Thorax: Mesonotal vittae indistinct but discernible; mesonotal pile short, sparse; pleural region tomentose except for katatergite and anepimeron; anepisternum and katatergite pilose; coxae tomentose, white pilose; legs orange with ventral proximal $\frac{1}{4}$ of femora, distal $\frac{1}{5}$ of tibiae and tarsi of mid and hindlegs black; foreleg entirely black except for proximal $\frac{2}{3}$ of tibia white and joint between femur and tibia orange; legs predominantly white pilose, distal $\frac{1}{3}$ of foretibia short, black pilose; wing veins light brown.

Abdomen: Tomentum absent dorsally, sparse ventrally; pile moderate, covering entire abdomen; tergites I–II fasciate.

Male.—Same as female holotype except as follows: abdominal pile longer; aedeagus as in Fig. 54; hypoproct as in Fig. 38; ventral gonocoxal spur and gonostylus as in Fig. 46.

Variation.—Overall length 4.9 mm to 5.2 mm ♂; 5.0 mm ♀.

Distribution and ecological placement.—*P. tomentamala* has been collected in association with dead twigs under *Cercidium* trees on inland stable sand dunes and in cotton fields. Although only eight specimens are presently known, they indicate a wide distributional range from Imperial, Riverside, and San Bernardino Counties in California and Maricopa County in Arizona.

Specimens examined.—Holotype: ♀, Irwin specimen number 1670, CAS type no. 10480; 10 km north of Glamis, Algodones Dunes, Imperial Co., California at **100 m**; MEI; May 21, 1967; under *Cercidium* tree. Paratypes: 3 ♂, 1 ♀. Other specimens: 2 ♂, 1 ♀. The following specimens were examined:

ARIZONA: **Maricopa Co.:** Gila Bend, 11.3 km NW, **215 m**, 61/04/10, RHP EMP, 1 ♂. CALIFORNIA: **Imperial Co.:** Calexico, 57/07/11, collector unknown,

1 ♀; Glamis, 10 km N, **100 m**, 67/05/21, MEI, 1 ♀. Holtville, nr., 75/08/10, GRB, 1 ♂, 1 ♀. **Riverside Co.:** Indio, Keosegan Ranch, 70/07/15, MEI, 1 ♂; 70/07/26, MEI, 1 ♂. **San Bernardino Co.:** Oro Grande, 54/06/16, collector unknown, 1 ♂.

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